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LOTHAL
A HARAPPAN PORT TOWN
(1955-62)

VOLUME I

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PREFACE

The delay in publishing the report on the excavations at Lothal which was ready in 1965 is due to certain technical difficulties, but I must add that this delay has enabled me to include a Chapter on the decipherment of the Indus Script. A more comprehensive work on the subject is in the press.

The present report is divided into two volumes. Volume I deals with the discovery of Lothal, the cuttings, stratigraphy, structures and cemetery. An attempt has also been made in this volume to throw some light on the religion and social life of the Harappans and their relation with the neighbouring countries. The observations made in Chapter XIV on the origin and authors of the Harappa Civilization are bound to be tentative but I can derive some satisfaction from the fact that the latest evidence available on the subject from the excavations of Harappan sites in India and Pakistan has been taken note of.

I hope the reader will not have to wait more than a few months for the release of Volume II which contains technical reports of the Chief Archaeological Chemist, Anthropologist, Zoologist and Botanist and also the description of individual portable finds.

I must express my gratitude to Shri M. N. Deshpande, Director General and Shri B. K. Thapar, Additional Director General, Archaeological Survey of India for expediting the publication of this Volume and to Shri B. D. Sen, Managing Director, Naba Mudran (Pvt) Ltd, Calcutta for excellent printing.

I am obliged to M/s. Asia Publishing House (Pvt.) Ltd., Bombay for permitting the reproduction of the illustrations of my forthcoming book *Decipherment of the Indus Script* in this Volume. I am thankful to Shri S. R. Varma, Sales Promotion Officer of the Archaeological Survey, for taking great pains to get the book printed neatly.

Bangalore
February 10, 1978.

S. R. Rao

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CHAPTER 1

INTRODUCTION

Ever since the discovery of Harappa and Mohenjo-daro in 1921-22, the Indus valley has been known to be the cradle of one of the earliest civilizations of the world. The archaeological excavations at the twin city-sites in the twenties and thirties of this century pushed back with a dramatic suddenness the history of India by nearly two thousand years and emphasized the existence of a 'dark age' between the end of the Indus (Harappa) Civilization and the beginning of the Buddhist period. Before any serious effort could be made to fill the gap and assess the contributions made by the Harappa Civilization to the later Indian cultures the subcontinent was partitioned in 1947 leaving hardly any important site of this great civilization within the present political boundaries of India. The Archaeological Survey of India took upon itself the task of exploring the regions east of the Indus valley with a view to locate Harappan sites, if any. Another phase of exploration included an assessment of the cultural affinities of Rangpur (fig. 1), a suspected outpost of Harappa Civilization in Saurashtra. The renewed excavation by the author in 1953-54 confirmed that Rangpur was a true Harappan settlement. At the same time it raised some new problems necessitating a village-to-village survey of Saurashtra which culminated in the discovery of more than forty Harappan sites, the chief among them being Lothal. The present report embodies the results of the excavations at Lothal and exploration of a number of sites of Harappa Civilization thus making it the most extensive among the ancient civilizations of the world. The recent discoveries have also thrown welcome light on the dispersal of the Harappans and their contribution to the present-day civilization of India.

Underlying the uniformity of the material products of the Harappa Civilization, there are certain regional variations. It is, therefore, desirable to study the morphology and climate of Gujarat in order to understand its regional character. Gujarat comprises of the peninsulas of Kutch and Kathiawar and the mainland adjoining the latter and extending southwards upto the river Damanganga (fig. 2).

1. PHYSICAL FEATURES

A. Kathiawar

Kathiawar, popularly known as Saurashtra, was once an island or a group of islands of volcanic origin separated from the mainland. A belt of salt-land, with occasional marshes and pools seen even today between the Little Rann of Kutch and the Gulf of Cambay, suggests that the northeastern margin of the peninsula was once washed by the sea. It

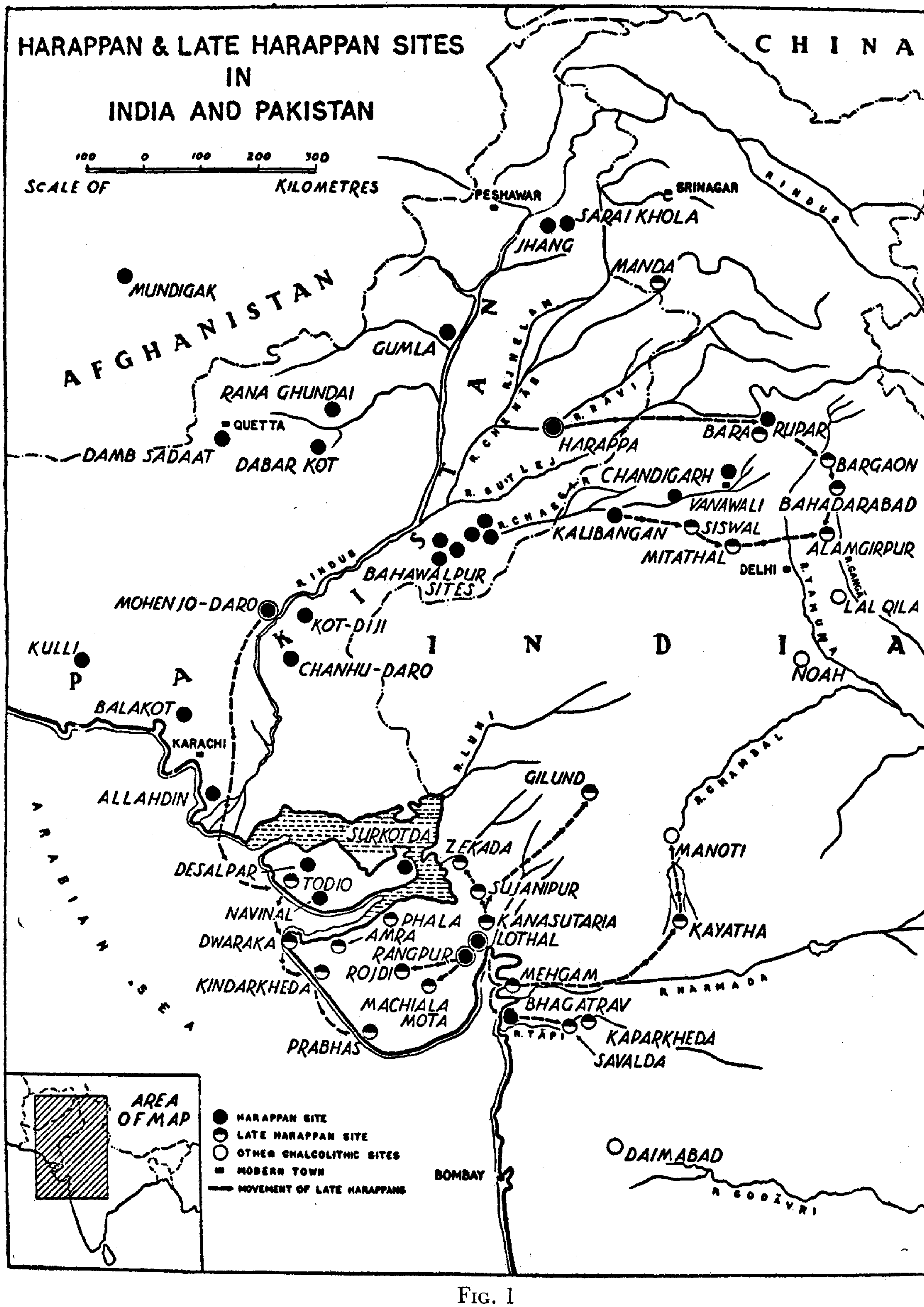

HARAPPAN & LATE HARAPPAN SITES
IN
INDIA AND PAKISTAN
100 0 100 200 300
SCALE OF KILOMETRES
CHINA
AFGHANISTAN
PAKISTAN
INDIA
ARABIAN SEA
PESHAWAR
SRINAGAR
SARAI KHOLA
JHANG
MANDA
MUNDIGAK
GUMLA
RANA GHUNDAI
QUETTA
DAMB SADAAT
DABAR KOT
HARAPPA
BARA
RUPAR
BARGAON
CHANDIGARH
VANAWALI
BAHADARABAD
KALIBANGAN
SISWAL
MITATHAL
ALAMGIRPUR
DELHI
LAL QILA
NOAH
BAHAWALPUR SITES
MOHENJO-DARO
KOT-DIJI
CHANHU-DARO
KULLI
BALAKOT
KARACHI
ALLAHDIN
GILUND
SURKOTDA
ZEKADA
DESALPAR
TODIO
SUJANIPUR
NAVINAL
PHALA
KANASUTARIA
DWARAKA
AMRA
LOTHAL
RANGPUR
ROJDI
MEHGAM
KINDARKHEDA
MACHIALA MOTA
BHAGATRAV
PRABHAS
KAPARKHEDA
SAVALDA
MANOTI
KAYATHA
DAIMABAD
BOMBAY
R. INDUS
R. JHELUM
R. CHENAB
R. RAVI
R. SUTLEJ
R. GHAGGAR
R. CHAMBAL
R. LUNI
R. YAMUNA
R. GANGA
R. NARMADA
R. TAPI
R. GODAVRI
AREA OF MAP
HARAPPAN SITE
LATE HARAPPAN SITE
OTHER CHALCOLITHIC SITES
MODERN TOWN
MOVEMENT OF LATE HARAPPANS

Fig. 1

was, however, gradually filled up by the detrital deposits brought by the Rupen, Luni and Banas rivers in protohistoric times.

Lying between the desert of Sind and the wet lands of central and south Gujarat, Kathiawar represents the nature of both.[1] The peninsula can be divided physically into three regions, namely, the coastal lands, the inland plain and the hills (fig. 2). In the south, the coastal strip is muddy and occasionally fringed with a line of wind-blown sand hills, while on the north-west, it is dotted with mangroves. The coastal band of alluvium is formed by the encroachment on the Little Rann of Kutch by the Luni and Rupen rivers and on the Gulf of Cambay by the Sabarmati and Bhogava. The upward slope of the alluvial band from the seaboard eastward is very gradual, so that, except where wind-blown accumulation of loam or sand makes small local eminences, the surface of the country appears to be a flat level plain. As one approaches the interior the monotony of flat plains is broken by the low hills or surface irregularities formed by the courses of small rivers. This fertile alluvial plain running almost parallel to the coastline sustains a large population, even as it did in ancient times. The hills in the central part of Kathiawar can be divided into the northeastern and southwestern series. The northeastern series are generally sterile except in the extreme west near the Barda Hills, and throw off several branches in different directions. They are indented by numerous streams into ridges. Gop, Rojdi, Pithadia, Randal-no-Dadwa, Adkot and Babarkot (fig. 3) are some of the Late Harappan settlements made on the banks of such streams. The central highlands form the water-parting between the rivers which run radially forming the drainage of the peninsula. They are very swift at their head-waters, but wind their way sluggishly as they pass through the flat alluvial plains before emptying themselves into the sea.

The 'Wadhwan Gateway' acts as a corridor between the peninsula and the mainland. The northern and southern extremities of the corridor are a salt-waste, while the central depression forms the Nal Lake. The tip near the Gulf known as *Bhal* is a flat low-lying plain drained by sluggish streams and subject to annual floods. The coastal fringes towards Bhavnagar and further south are also marshy but the indented coastline provides anchorage for ships near the river mouths. Foreigners who landed on the Kathiawar coast in the protohistoric period settled down at the estuarine ports and moved gradually into the interior.

A word may be said about the flora and fauna of the peninsula. The coast round the head of the Arabian Sea is rocky, but inland, it shows every variety of scenery; from the arid sandy tracts of Okhamandal and Jamnagar in the north-west to Jhalawad in the east covered with cactus and desert bushes; from the desolate waste of the Rann to the southwestern seaboard, where throughout the year sturdy trees and green fields can be seen; from the salt-charged plains of the Bhal-Nalkantha area—desolate and waterless in the hot season—to the rich seaboard tracts between the Gulf of Cambay and Porbandar; from the sterile hills of Halar and Jhalawad to the peaks of Girnar rising over the wooded range of Junagadh district, the habitat of Indian lions.

[1] Watson (ed.), *Gazetteer of the Bombay Presidency*, vol. VIII, *Kathiawar* (Bombay 1884), pp. 62ff.

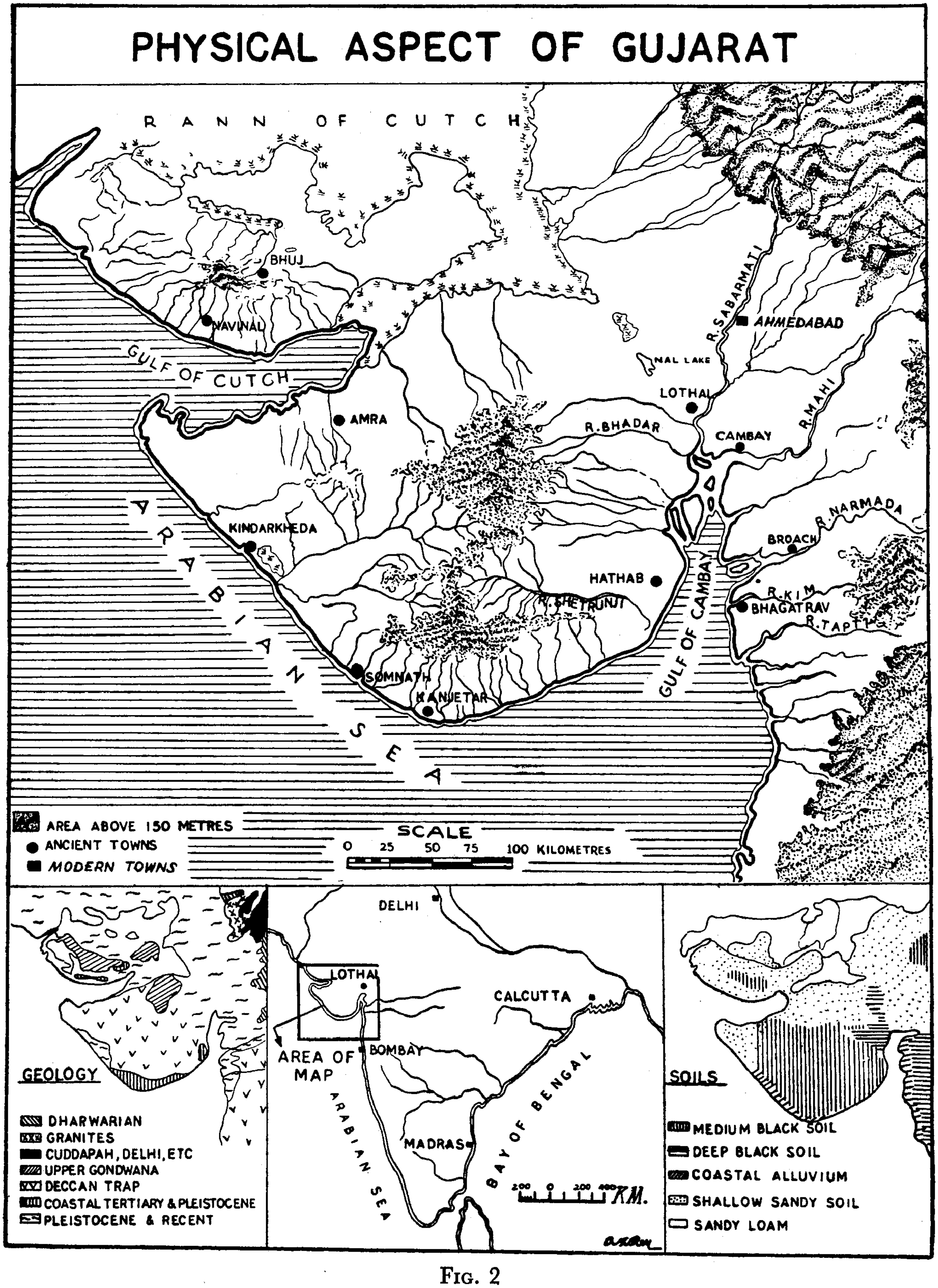

PHYSICAL ASPECT OF GUJARAT
RANN OF CUTCH
BHUJ
NAVINAL
GULF OF CUTCH
AMRA
KINDARKHEDA
ARABIAN SEA
SOMNATH
KANJETAR
R. SHETRUNJI
HATHAB
GULF OF CAMBAY
R. BHADAR
LOTHAL
NAL LAKE
AHMEDABAD
R. SABARMATI
CAMBAY
R. MAHI
R. NARMADA
BROACH
R. KIM
BHAGATRAV
R. TAPTI
AREA ABOVE 150 METRES
ANCIENT TOWNS
MODERN TOWNS
SCALE
0 25 50 75 100 KILOMETRES
GEOLOGY
DHARWARIAN
GRANITES
CUDDAPAH, DELHI, ETC
UPPER GONDWANA
DECCAN TRAP
COASTAL TERTIARY & PLEISTOCENE
PLEISTOCENE & RECENT
DELHI
LOTHAL
CALCUTTA
AREA OF MAP
BOMBAY
ARABIAN SEA
BAY OF BENGAL
MADRAS
200 0 200 400 KM.
SOILS
MEDIUM BLACK SOIL
DEEP BLACK SOIL
COASTAL ALLUVIUM
SHALLOW SANDY SOIL
SANDY LOAM

FIG. 2

B. Kutch

Kutch was also an island in prehistoric times. According to the author of the *Periplus* there was open sea between Kutch and the Indus.[1] The process of filling up the shallow sea between the peninsula and the mainland by the alluvial deposits of the rivers such as the Banas and the Luni is still in progress. The only hills worth noting are the Bhuj series in the centre of the peninsula composed of the Deccan trap overlain by laterites in some places and miliolites in others. Wind-blown sand from Thar-Parkar caps the northern fringes of the hills. The northeastern parts of the peninsula are a marsh, while the flat and featureless plains of Chad-bet are surcharged with saltpetre. Scrub jungle covers the flat plains.

The narrow belt between the hills and coast permits cultivation of crops. An eastern branch of the Indus river known as Nara used to join the Rann of Kutch, but as a result of the upheaval during the earthquake of 1933 it has ceased to flow into the Rann. The Rann was navigable in the time of the author of the *Periplus*[1] and should have been undoubtedly approachable by ships in the third and second millennia B.C. It is likely that the Harappans sailed down the Nara, entered the Rann, and moving along the western and southern coasts of Kutch and Kathiawar reached the Gulf of Cambay. It is suggested by some scholars that Lothal was reached through the Little Rann and the Nal Lake which were then easily navigable. But there is no evidence to show that the Harappans ever followed this route in preference to the coastal one. The probable route followed by them is discussed elsewhere in this chapter (below p. 14).

The aspect of Kutch is very much similar to that of Kathiawar, but the former is more wooded and less fertile in the centre.

C. Mainland of Gujarat

The mainland of Gujarat is an alluvial plain partly formed by the annual flood-deposits of the Sabarmati, Mahi, Narmada and Tapti rivers. Physically, the region can be divided into the coastal area, the plains proper and the eastern highlands. A narrow fringe of wasteland delimited by the tidal waters of numerous parallel streams that flow through Gujarat can be seen right from the Damanganga estuary in the south to the Gulf of Kutch in the north, and along the southern borders of Ahmadabad District. This region of salt and marsh built by the sea and rivers is, at present, little used for cultivation. The southern half of the narrow coastal belt stretching from the river Damanganga to the river Kim is a barren stretch of sand-drift and salt-marsh fringed here and there with small hills. Except at a few places, water is brackish and scanty making cultivation difficult. A belt of highly cultivable land lies beyond the reach of the tidal waters. The deeper loam brought down by the rivers Tapti and Ambika gives a uniformly rich and level aspect to Kamrej and other areas. Towards Broach the coastal belt broadens and becomes fertile enough to be good pasture land. The Gulf of Cambay is another vast salt—marsh flooded by spring tides. The average height of the plain is 40 to 50 ft. above the mean sea level. In

[1] *Periplus of the Erythrean Sea*, pp. 173-174.

ancient times the land was much lower, and the sea much nearer, than what we see around Lothal. At present the tidal displacement in the Bhogava river is 6 ft. at Bholad and 8 to 9 ft. at Moti Boru (fig. 20). Sometimes the tidal waters find a ready entrance through the river estauries, and passing behind the sand drifts, as at Mithli, make their way through miles of low-lying country. Around the head of the Gulf of Cambay the ancient channels of the rivers, which are now silted up, act as drains for springtides, but otherwise remain a salt-marsh. Other lands, generally beyond the reach of the sea are, at springtides, covered with a shallow film of salt-water. The loam brought in by the Bhogava, Bhadar, Sabarmati and their tributaries gives the Bhal region a uniformly level aspect. Black silt is extremely suitable for growing cotton and wheat, and in a few places, rice too. Further north the Viramgam plain is flat but subject to flood in spring time. The northern plains rise gradually and the hills sink once again into a plateau in the Banaskantha and Sabarkantha districts. Between the Palanpur hills and the flat alluvial plains of the Bhal are hillocks and ridges of blown sandy loam rising 50 to 60 ft. above the mean sea level.

The northeastern hills consist of the outliers of the Aravalli system, the Vindhyas, the Satpuras and the Sahyadris. These hills are detached masses of Deccan trap rising from an undulating country, and are, at times, jungle-clad. Some are ridges formed by the outcrops of the dykes of harder trap running through the softer mass of the flows, which are more extensively weathered away.

To the east of the river Sabarmati the country is fairly well-wooded and to the south-east it is picturesque with hills and fields. To the west the country becomes monotonous. On the whole, Ahmadabad and Mehsana districts consist of one continuous plain sloping gently from north-east to south-west, the monotony being broken by loessic hills. In the southern half of the great Gujarat plain there is, for the most part, a surface soil of black loam, a vast alluvial deposit. In the northern half the soil is light-red sandy loam, but on the borders between the two, it is an admixture of sandy soil. The black soil extending from Surat to Baroda is not only very fertile but also remarkable for the desert-like appearance it gives to the country where it predominates. Scrub jungle of *Accacia* seems to have formed the vegetation suitable for rhinoceros and wild bear. The only vegetation seen today for miles around Lothal is the *Accacia.* Occasionally, some trees are seen near the villages. Further north, the aspect changes with red soil. The entire region is cultivated, and the conspicuous absence of water-channels may be noted. South of Baroda there is a vast plain of black soil, and the region becomes picturesque with hills of Rajpipla. Beyond the Tapti, heaps of drifted sand can be seen along the coast.

D. Rivers

At first, swift and clear, gliding along rocky channels between steep banks, the rivers of Kathiawar flow from the inner of the two hill tracts outward to all points of the compass. Winding sluggishly through the low-lying lands they enter the sea at points nearly opposite the slopes where they take their rise. During the south-west monsoon they pour

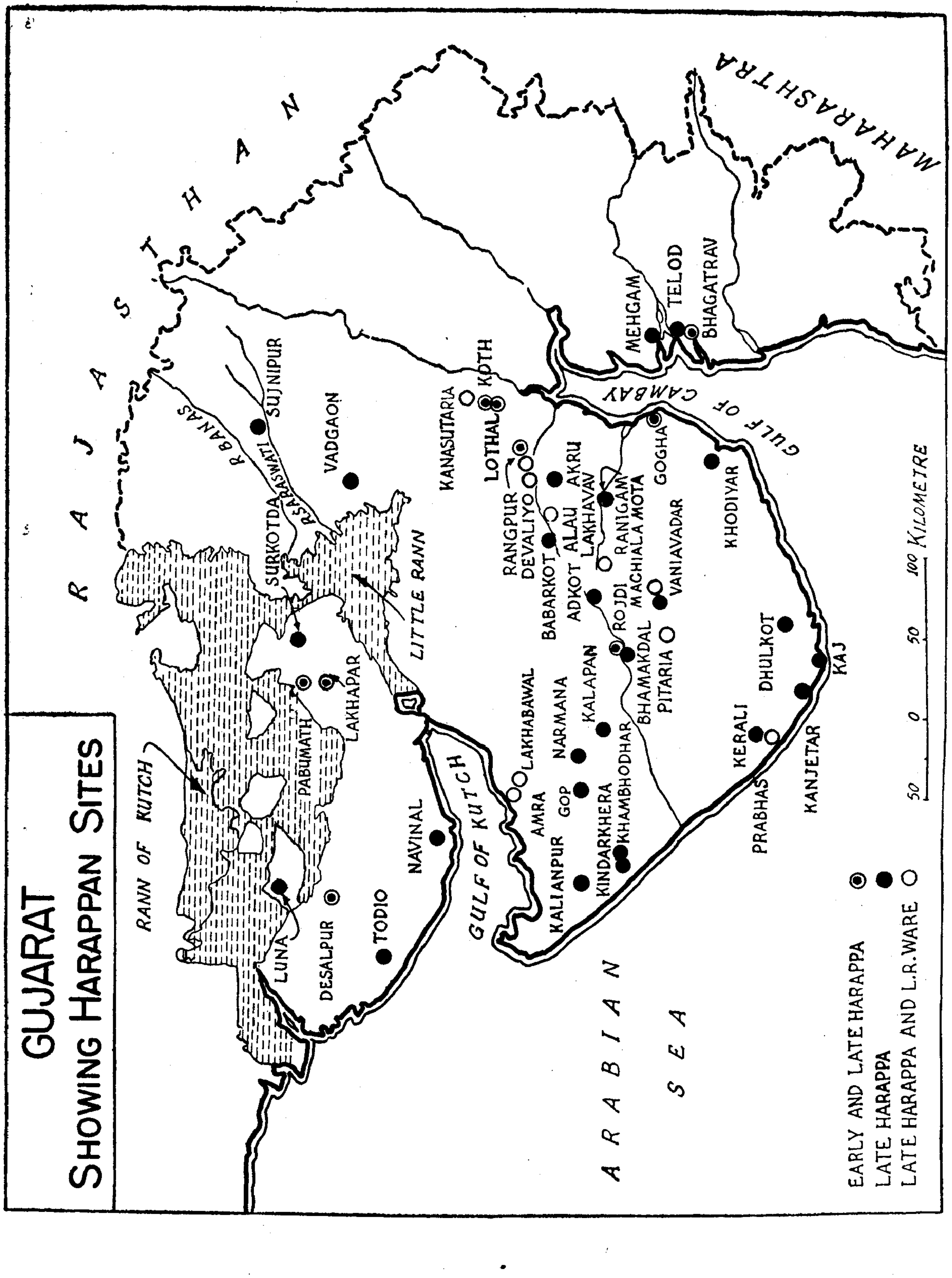


FIG. 3

Note : 1. *Desalpur is also spelt Desalpar and Kinderkhera as Kinderkheda.*
2. *Navinal and Surkotda have early Harappan deposits also.*

seaward in turbid floods. The more important rivers are the Bhogava, Bhadar and Shetrunji discharging into the Gulf of Cambay, the Saraswati, Bhadar, Ghelo and Kalubhar joining the Arabian Sea and the Rangmati joining the Gulf of Kutch.

For its size the Gulf of Cambay receives the waters of a remarkable number of rivers belonging to two groups, one comprising of westward-flowing rivers of great length, and the other, of southward-flowing ones. The large continential rivers flowing from north to south are the Sabarmati and Mahi. The Dadhar, Narmada, Kim, Tapti, and the Ambika flow westward.

The Bhadar, the largest river of Kathiawar, rises from the springs in a range of hills a few miles to the north of the town of Jasdan and joins the sea at Navi Bandar. For one third the distance from its rise it has the character of a hill-stream flowing in a rocky channel. In the middle third it rceives a number of streams among which the Utavali, the Phophal, the Moj and the Vinu are important. At Kutiana, the Bhadar comes within the influence of the sea and forms a tidal river twenty miles east of Navi Bandar on the west coast after receiving the Minsar and Ojat. The lowness of the land and proximity to the sea have rendered the estuary salty over an area of several hundred square miles. Among the Harappan settlements on the banks of the Bhadar river Rojdi is very important. The next important river of the peninsula is the Shetrunji, also rising in the Dhundi hills of the Gir. It receives a number of small streams, and winds its way to Sultanpur before entering the Gulf of Cambay. Machiala Mota and Vaniavadar (fig. 3) are two important Late Harappan settlements situated on its tributaries, the Vadi and Thebi.

The Sukha Bhadar rising on the eastern flanks of the same hills on which the Bhadar rises is about 120 miles in length. Flowing eastward past the town of Rangpur it enters the Rann of Cambay near its junction with the Gulf. Originally, the Sukha Bhadar flowed past Dhanduka and formed the creek of Dholera. It left its old bed once in 1812 and again in 1833-34 and cut its present channel four miles west of Dhandhuka. Rangpur is an important Harappan site situated on this river. Among other sites, slightly later in date, situated on its bank are Devaliyo, Babarkot etc.

The streams such as Keri, Ghelo and the Kalubhar are similar in character to the Sukha Bhadar. Rising in the central hills, they flow eastward and meet on the coast before joining the Gulf of Cambay near the town of Bhavanagar. Many other small streams flow radially and, rising on the flanks of the central hills, some join the Rann of Kutch and others the Arabian Sea. The Hiran and the Saraswati, rising in the Gir, meet near the temple of Somanath Patan where an important Late Harappan site is situated. The confluence known as Triveni is held sacred, as Lord Krishna is said to have left his mortal remains here. Eight miles towards the hills, the Saraswati passes through a reservoir called the Prachikund, another sacred place.

Among the rivers of the mainland, the Sabarmati, Mahi, Narmada and Tapti are important from the point of view of water supply and drainage. The name Sabarmati is derived from the names of two rivers, namely, the Sabar and the Hathmati. The Sabar rises in the southwestern spurs of the Aravalli hills and takes a southerly turn before it is joined by the Hathmati. Thereafter, it takes the name Sabarmati, and flowing for about 200 miles through Dehgam, Diskroi and Dholka taluks discharges itself into the Gulf of

Cambay. It is joined by the Khari which rises in the hills near Ahmadnagar in Sabarkantha District (former Idar State) before receiving the Vatrak and Meshvo rivers opposite Vantha near Kaira. Both Vatrak and Meshvo rise to the south of Dungarpur. The Sabarmati has changed its course several times after silting up its earlier channels especially near the Gulf. Lothal and Koth, the two early Harappan sites in Gujarat, are situated on the banks of one of its extinct flow-channels in Bhal.

The Saraswati river is a small but holy stream rising in the hills of the Mahikantha District. It joins the Rann near Anvapur after flowing past Siddhpur, and disappears under ground for some distance before rising again near Radhanpur. Sujnipur, a post-Harappan chalcolithic site, is situated on the Saraswati river near Patan (fig. 3).

The Mahi is referred to as *Mophis* by Ptolemy and is identified with *Mais* of the *Periplus*. Rising in the Amjhera district of Gwalior it enters Rajputana and cuts through deep gorges. After flowing for some distance it passes into Gujarat. The hilly tracts through which the Mahi passes is inhabited by Bhils and other tribal people. Its estuary is so wide that it is called Mahisagar. The Narmada river, the *Namados* of Ptolemy and *Namnadios* of the *Periplus*, rises at Amarkantak in the Satpura range. Winding through the rugged hills of Nandla it rushes through the 'Marble Rocks' near Jabbalpur and enters a fertile basin forming the Narmada valley between the Vindhyan and Satpura ranges. After forming its second fertile alluvial basin in the former Indore State it finally enters Gujarat, and before joining the sea near Broach, it renders fertile the plains over a distance of 170 miles. The Narmada is one of the most sacred rivers referred to in the Epics. The Tapti rises in the Satpura hills, and after flowing for some distance in the Vidarbha region, it enters Khandesh, and finally empties itself into the Arabian Sea near Surat. It is tidal for about 30 miles. Both the Narmada and the Tapti frequently flood vast areas in the estuary and cause great havoc.

2. TRADITION

The pre-Mauryan history of Gujarat is based on literary tradition as gathered from the Epics, Purāṇas, Buddhist Jātaka stories and Jaina works.

Gujarat, including Saurashtra, has been traditionally known as Ānarta, with its capital at Kuśasthali, on the ruins of which Dvārāvati came to be built later on. Ānarta derived its name from Anarta, son of Saryāta Mānava, mentioned as a singer in the *Rigveda*. The *Brāhmaṇas* also refer to Saryāta in connection with the rejuvenation of Chyavana, who is said to have lived near modern Khedbrahma in north Gujarat. Among the Aryan tribes mentioned in the *Rigveda Saṁhitā* the Bhrigus who had their hermitages on the banks of the Narmada are famous. The modern city of Broach, identified with Bhrigukachchha or the later *Barygaza* of the Greek writers, was one of the *Bhrigutīrthas* which sanctified the Narmada. Next in importance to the Bhrigus are the Yādavas. The word Yadu occurs in the *Rigveda* as the name of a king and his tribe. Kakudmin Raivata is said to have given his kingdom of Kuśasthali to the Yādavas after Balarāma accepted the former's daughter in marriage. According to the *Śatapatha Brāhmaṇa* Bharata defeated

the Satvats, one of the sects of the Yādavas. Other sects mentioned in the Purāṇas are the Vitihotras and Haihayas. The Satvats are further subdivided into Devaviddhas, Andhakas Bhojas and Vṛishṇis.[1] The *Ashṭādhyāyī* of Pāṇini[2] mentions the Andhakas and Vṛishṇis, while Kauṭilya[3] refers to the Vṛishṇi Saṅgha. It is, therefore, evident that the Yādavas had started migrating to Dvārāvati long before Krishna did, but large-scale migration seems to have taken place in the Mahābhārata period as a sequel to the frequent invasion of Mathura by Jarāsandha, king of Magadha.

Gujarat, Malwa, Rajputana and northern Deccan came under the occupation of the Yādavas whose laxity in the observance of the Aryan *dharma* and unrestrained mixing with the non-Aryans seem to be the main reason why the Purāṇas and Epics call the Yādava branches 'Asuras' and group them with the Nichyas and Apachyas. As a result of their marital relations with the non-Aryans they could spread the Aryan culture widely and aryanize the outsiders. Their leader Krishṇa held liberal views and his doctrines went a long way in converting many non-Aryan tribes to the Aryan fold. The *Āraṇyaka-parva* of the *Mahābhārata* mentions that when Yudhishṭhira passed through Aparānta (seaboard north of Bombay now included in south Gujarat) he noticed a number of Aryan colonies such as the *āśramas* of the Bhrigus on the Narmada and the hermitage of Markaṇḍeya on the Payoshṇi which is identified with the Tapti.

Among other places in Saurashtra mentioned in the *Harivaṁśa,* Dwaraka, Prabhāsapaṭṭana (Somanātha), Sudhāmapuri (Kinderkhera near Porbandar) and Zilan-Gop are important because of their association with the legend of Krishṇa. It may not be mere coincidence that Late Harappan sites are located near those places in Saurashtra which find mention in the *Mahābhārata.*

The Jaina and Buddhist works have also recorded tradition prevalent in Gujarat. According to the *Mahāvaṁśa* and *Dīpavaṁśa,* Simhaladvipa, modern Ceylon, is said to derive its name from Siṁhabāhu of Siṁhapura (modern Sehor near Bhavanagar) which was another name for Gujarat in ancient times. Vijaya, son of Siṁhabāhu is said to have founded a kingdom and given Ceylon the name Siṁhaladvipa. While sailing from Siṁhapura southwards his ship is said to have stopped at Śūrpāraka, modern Sopara in Thana District of the Bombay (Maharashtra) State. He arrived in Ceylon shortly before the death of the Buddha (483 B.C.). Since then Ceylon had close maritime intercourse with Bharukachchha and Śūrpāraka. It is necessary to add that these ancient texts have preserved the names of ancient ports some of which go back to the Harappan times.

Again the term *Kachchha* refers to the waterlogged region as distinct from the desert region of the north.

Pāṇini refers to names of towns ending in *Kachchha (Kachādibhyaścha)*,[4] and situated along the coast extending from *Bhrigukachchha* to the province of Kaccha. The *Kāśika* instances

[1] H. N. Apte (ed.), *Matsya Purāṇa* (Anandasrama Sanskrita Granthavali, Poona, 1907), pp. 43-44.; also refer H. N. Apte (ed.), *Vāyu Purāṇa* (Poona, 1905), pp. 94-95.

[2] *Ashṭhādhyāyī,* IV. 1. 114 ; VI. 2. 34.

[3] R. Shama Sastry, *Kauṭilya's Artha Śāstra,* (Mysore, 1967), p. 11.

[4] *Ashṭādhyāyī,* IV. 2. 133.

under *Kachchha, Dāru-Kachchha* and *Pippalī-Kachchha* (Rajpipla near the mouth of the Narmada); under *agni, Khaṇḍāgni* and *Vibhujāgni* (modern Bhuj); under *Vaktra, Sindhu-vaktrā;* under *garta, Bāhugartā* and *Chakragartā.* These four pairs of eight geographical names are preserved as grammatical examples from antiquity. To the east and south-east of the head of the Gulf of Cambay is *Pippalī-kachchha,* the seacoast of Pippali comprising the delta areas of the Sabarmati, Mahi, Narmada and Tapti rivers. The ancient name is still preserved in Pipla or Rajpipla. To the west is the seacoast of Kathiawar, the literal equivalent of *Dāru-Kachchha (Dāru-Kashṭa).* The word *agni* refers to a burning sandy tract equal to Sanskrit *Iriṇa* or Rann. *Vibhujāgni* refers to the great Rann of Kutch-Bhuj in the north-west and *Khaṇḍāgni* to the Little Rann of Kutch and onwards.

Pāṇini also refers to the compound names *Kunti-Surāshṭraḥ* and *Chinti-Surāshṭraḥ* (IV. 2. 37). The names indicate the period when the royal houses of Kunti and Chinti were tied to Surāshṭra. The *Gaṇa-pāṭha* enumerates Anarta country under Dhumadi (IV. 2. 127) and the river Mahi under Nadvadi (IV. 2. 97).

After the destruction of the Yādavas many foreigners appear to have settled down in Kachchha, Saurashtra and Lāṭa, since the estuarine ports offered ample opportunities for foreign trade right from the days of the Harappa Civilization. Gujarat came to be considered a *mlechchha* country by the Hindu Dharma-śāstras mainly because of the foreign settlements, and except on pilgrimage, visits to Gujarat were forbidden.[1] This may be the reason why the *Sthavira* named *Dhammo-rakkhito Yavana* was sent as evangelist to Gujarat which had a foreign population. It is interesting to note that the *Baudhāyana* says that 'the people of Saurashtra are of mixed blood.'[2]

Information regarding the flora and fauna of Gujarat is also available in the ancient texts. The *Arthaśāstra*[3] says that the cotton of Aparānta, Madhıvra (Madurai), Mahisha, Kaliṅga and Konkaṇa is the best. The same authority, while speaking of the qualities of elephants from different countries, says that the elephants of Saurashtra and Panchajana countries are of low or middle quality, the best being those from Kaliṅga, Aṅga, Karusha and the east. Speaking of rain, Kauṭilya says that it rains immensely in Aparānta (i.e., west coast).

3. PREHISTORY

Gujarat was inhabited by man in the Middle and Upper Pleistocene periods as well as in the Holocene. Tools of the Early Stone Age, Middle Stone Age and Late Stone Age have been found in the mainland of Gujarat and, more recently, in the Kathiawar peninsula also. Hirpura, Aglod and Pedhamli are some of the palaeolithic sites on the Sabarmati river which have yielded handaxes of the Chelles-Acheulian, the Middle Acheulian and the Late Acheulian industries. From the beds of the Mahi, Orsang and Karjan rivers come

[1] H. H. Wilson (ed.), *Vishṇu Purāṇa* (London, 1868), IV ; 24.

[2] *Baudhāyana Dharmasūtras* I, 1-2-14.

[3] R. Shyama Sastry, *op. cit.*, p. 50.

stone tools which suggest a Middle-Upper Palaeolithic element.[1] K.V. Soundararajan has recently collected a number of handaxes and cleavers from a site near Halvad in central Kathiawar, which belong to the Abbevillio-Acheulian and Late Acheulian industries. Kathiawar is also known for Middle Stone Age tools, which were hitherto called Series II tools. They occur in the basal gravel of the Bhadar river at Rangpur in Limbdi taluka of Surendranagar District (fig. 1). The material used here is mostly jasper, and the tools consist of thin blades and assymetrical flakes retouched into scrapers.[2] To the Late Stone Age belong geometric and non-geometric microliths found at several sites in Gujarat, the most important among them being Langhnaj in Mehsana district. This site has been systematically excavated and two cultural periods are distinguished by late B. Subba Rao. Period I yielded geometric microliths besides animal and human skeletons, while Period II is noted for handmade pottery, microliths and stone maceheads.

A similar reportoire of cultural artefacts is noticed in the pre-Harappan context at Rangpur.

In the absence of substantial evidence of neolithic culture in Gujarat so far it must be presumed that the semi-nomadic folk using microliths and hand-made or wheel-made pottery filled the gap. They lived on the sand dunes of north Gujarat and the hill slopes of central Kathiawar before the advent of the Harappans. Their main occupations were hunting and fishing, but the maceheads and querns of Langhnaj suggest some kind of food production. Besides these folk, there lived on the coastal plains a chalcolithic people using a micaceous red painted pottery, stone blades and flimsy copper tools. Against the background of a mixed economy of the microlithic folk of north Gujarat and a more advanced economy of small chalcolithic villages on the Kathiawar coast must be viewed the imposition of a highly sophisticated urban economy of the Harappa Civilization. Its impact was tremendous as we shall see later at Lothal and other sites in Gujarat.

4. DISCOVERY OF LOTHAL

Lothal was discovered as a result of a systematic survey of Gujarat undertaken by the author in the year 1954 as part of the programme for locating Harappan settlements within the present-day borders of India. It may be recalled that although the 1953 excavation at Rangpur, a site 32 miles south-west of Lothal, had confirmed that the Harappa Civilization had extended as far south as Saurashtra, it remained to be explained why and when the Harappans entered the peninsula. The presence of the Buff Ware and the Lustrous Red Ware in the cultural mileau of Rangpur called for a satisfactory explanation, while the absence of the typical Indus seal emphasized the necessity of further exploration. The only way to find solutions to some of these problems was to look for more prosperous Harappan settlements where typical Indus objects including seals could be

[1] H. D. Sankalia, *Prehistory and Protohistory of India and Pakistan* (Bombay 1962), pp. 50-51.

[2] S. R. Rao 'Excavations at Rangpur and other Explorations in Gujarat,' *Ancient India*, nos. 18 & 19 (1962-63), ed. A. Ghosh, pp. 48-50.

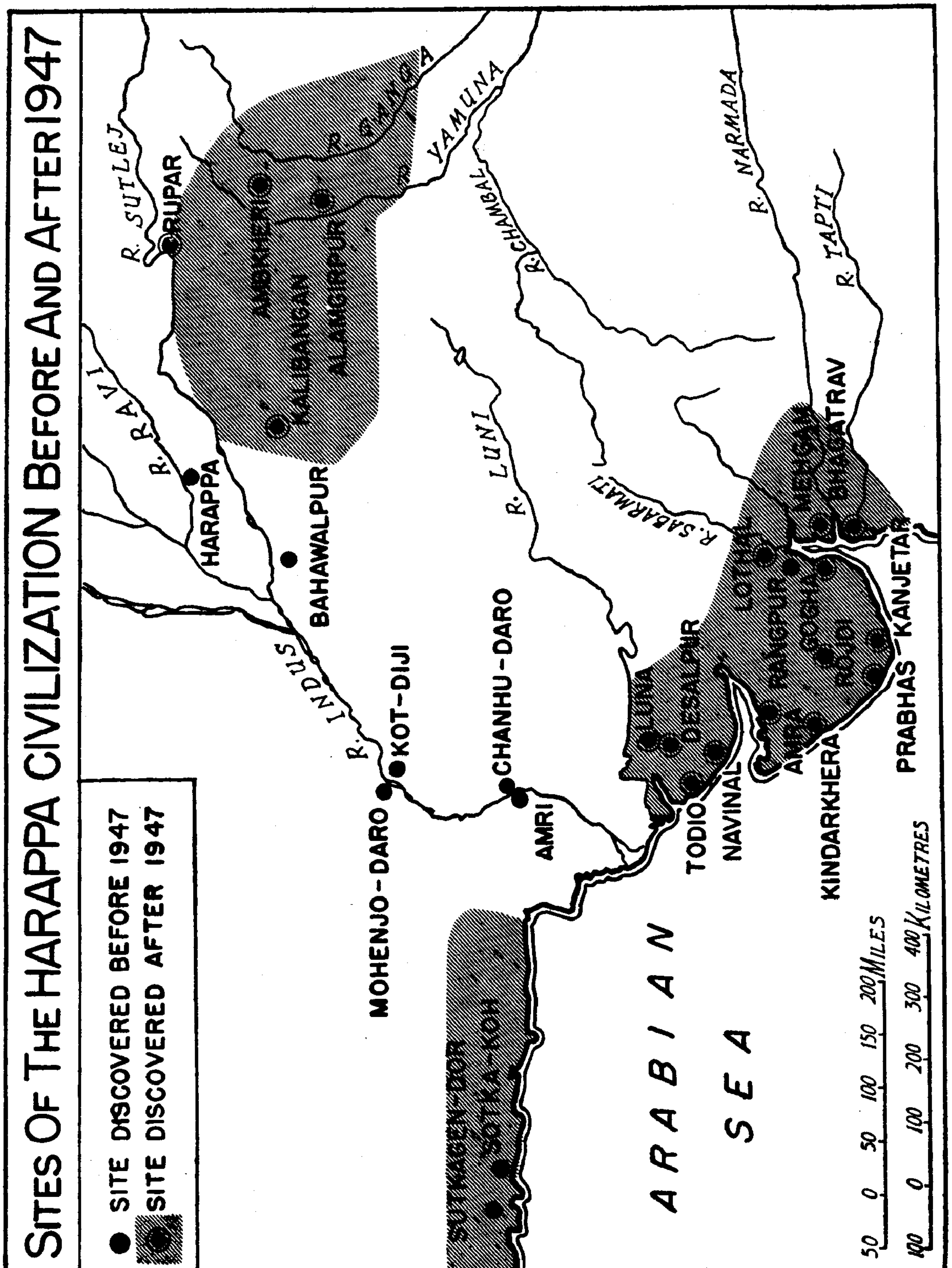


FIG. 4

Note: Desalpur and Kinderkhera are also spelt Desalpar and Kinderkheda respectively.

expected. Such sites, it was thought, lay along the route followed by the Harappans on their march from Sind to Saurashtra. For a long time the corridor connecting the peninsula with the mainland and drained by the Sabarmati and its tributaries has been the channel through which cultural streams have flowed in the early historical period. As such, it was presumed that the Harappans also had followed the same route. A riverine civilization such as the Harappan must have preferred the alluvial plains of the lower Sabarmati system to the hilly regions of the upper reaches for making permanent settlements. Bearing this in mind we decided to commence the search for Harappan sites by examining ancient mounds near Dholka and Bavla, but both were found to belong to the early centuries of the Christian era. There was little chance of finding Harappan sites in north Gujarat owing to the fact that thick wind-blown deposits have buried protohistoric settlements, if any. Hence the estuary of the Sabarmati between Rangpur and Dholka was taken up for a village-to-village survey. This necessitated wading through knee-deep waters and slush at many places. As the prospect of reaching the mouth of the Sabarmati immediately after the monsoon appeared bleak, we had almost decided to postpone further survey by a few months. But the dogged perseverence of Baburao Kadam, the chaffeur, brought the party to Gundi from Arnej through the marshy land. With the help of an enthusiastic resident of Gundi, namely Mehpat Singh, we crossed the water-logged fields and reached a lowlying mound near Laxmipura. From the pottery and other objects collected from surface it became evident that the mound, locally known as Lothal, was a true Harappan settlement.

5. FURTHER EXPLORATION (fig. 4)

The discovery of Lothal increased the possibilities of finding more Harappan sites in the plains of the Sabarmati and the Bhadar rivers. The expectation was soon fulfilled when the ancient sites at Chachana, Samadhiala and Devaliyo Mota—all situated within a radius of ten miles from Rangpur—yielded painted pottery of Harappan origin suggesting a decadent phase of the Harappa Civilization. Some of them appeared to be later than Lothal. The ceramic and lithic equipment of Rangpur, Lothal and Devaliyo made it abundantly clear that all the protohistoric sites in the Sabarmati-Bhadar system did not belong to one and the same phase of the Harappa Civilization. Some could be assigned to the early phase of Rangpur and others to the later phase. Further exploration provided useful negative evidence regarding the plausible route followed by the early Harappans in reaching Saurashtra (fig. 1). The absence of Harappan settlements north of Rangpur, especially in the corridor extending from Viramgam to Kharaghoda, confirmed that the Harappans had not come from the north to Lothal, the implication being that they followed a route other than the one passing through the 'Wadhwan Gateway'. A rapid survey of central Saurashtra, which is mostly arid and hilly, brought to light some more late sites around Jasdan, Gondal and Jamjodhpur which yielded pottery of the late phases of Rangpur. To this list of Late Harappan sites must be added two more near Amreli, namely Vaniavadar and Machiala Mota excavated by the author in 1952. Late Shri P. P. Pandya also made

some significant contributions by locating thirty-five Late Harappan sites near Jamnagar, Porbandar, Botad and Rajkot, details of which are mentioned in the report on Rangpur excavation. A brief resume of the exploration is given below for ready reference.

Out of eighty-eight protohistoric sites plotted on the map of Gujarat as a result of the joint efforts of the Archaeological Survey of India and the Archaeological Department of the erstwhile Saurashtra Government during the years 1954 to 1959 only six, namely Desalpur[1] and Navinal in Kutch, Lothal, Koth and Rangpur in Saurashtra and Bhagatrav in south Gujarat belong to the mature phase of the Harappa Civilization. Even so, Lothal is the earliest among them. To this list must be added Gogha. All the rest are later settlements made after *circa* 1900 B.C. by the Harappan refugees who came from the lower Indus valley or the Sabarmati estuary. The overall degeneration of the culture has led us to designate these sites as 'Late Harappan' as distinct from the early or mature 'Harappan' sites. The conspicuous absence of early Harappan sites in the land-bridge between Kathiawar and the mainland of Gujarat suggests that the first movement of the Harappans from lower Sind to Lothal was along the sea-coast. The second wave of Harappans took the same route. This time they landed at the estuarine ports of Luna, Kotda, Kerasi, Jhangar and Todio in Kutch, Amra, Lakhabawal, Prabhas (Somanath), Kindar-Khera and Kanjetar in Kathiawar and Mehgam and Telod in the Narmada estuary, wherefrom they gradually fanned out in different directions in search of better shelters and natural resources for their sustenance (fig. 3).

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[1] Desalpur is also spelt Desalpar.

and that on Plant Remains forming Chapter XXV are contributed by Shri Bhola Nath, Vertebrate Zoologist in the Zoological Survey of India, and Sarvashri Ramesh Rao and Krishna Lal of the Wood Anatomy Branch of the Forest Research Institute, Dehra Dun, respectively. Late V. K. Chari, Keeper, Natural History Section of the Prince of Wales Museum, Bombay, kindly examined the shells, and Shri H. P. Oza, Director of Ports, Ahmadabad investigated into the problems relating to the dock and his valuable report is incorporated in Chapter X. Prof. D. Lal of the Carbon-14 Laboratory in the Tata Institute of Fundamental Research has given us dates based on Carbon-14 determinations, while Dr. Subramanyam, Director, Ahmadabad Textile Industry's Research Institute, kindly examined a terracotta sealing bearing impressions of textiles. I am highly indebted to all these scientists and experts for their valuable contributions.

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MEASUREMENTS

The measurements are given in the British system since the excavation was conducted prior to the introduction of the decimal system.

CHAPTER II

THE SITE AND ITS PROBLEMS

1. THE SITE

The word 'Lothal' in Gujarati formed by combining the words *Loth* and *thal (sthal)* means 'the mound of the dead'. The word 'Mohenjo-daro' in Sindhi also conveys the same meaning. It is held by some scholars that two Sanskrit words, namely *loḍh* and *sthal,* might have been combined to form the word Lothal, in which case it may refer to a place where boats are moored or repaired.

A. Location

The ancient mound, set in a flat featureless alluvial lowland called Bhāl is situated on the northern margin of the boundary line separating Saragwala village from Laximpura, and is included in the revenue jurisdiction of the former village. It rises gradually to a height of eighteen feet from the surrounding fields (pls. I and II). Saragwala which was formerly under the administration of the Sanand *Darbār* (local chieftain), is now administered in the Collectorate of Ahmadabad. The mound (Long. 72° 14′ 25″ E and Lat. 22° 31′ 25″ N) is situated 4 miles away from Bhurkhi, a small railway station, renamed Lothal-Bhurkhi, on the metre-guage line of the Ahmadabad-Bhavnagar section of the Western Railway. Until 1961 there was no good road connecting Lothal or any nearby village with Bhurkhi. The only access was by a cart-track from Gundi to Saragwala passing through the village of Laxmipura and touching the western margin of the Lothal mound. This track is submerged under water for more than four months in the year. Thanks to the Government of Gujarat for constructing a metalled road connecting Lothal with Bhurki. It is now possible to reach the site by road at any time of the year from Ahmadabad or any other important town in the district. Ahmadabad, the State capital, is about 52 miles from Lothal.

B. The Environs

Lothal lies between two ranns or salt-wastes, namely, the Rann of Cambay on the south and the Little Rann of Kutch on the north, with the Nal Lake in the centre. The Rann of Cambay is a long shallow dry eastuary (fig. 20) extending 35 miles north-west from the mouth of the Sabarmati river. During the monsoon the lower part 'joins the Nal Lake forming a connected sheet of water which spreads over the neighbouring tracts of Bhāl

and the Nalkāntha, turning the villages into islands and cutting off communication with Ahmadabad'.[1] The ancient mound is sandwiched between the Bhogava and Sabarmati rivers which frequenty overflow their banks and inundate the plains. Besides hundreds of villages, the Lothal mound too was submerged by the great flood in 1927. Sheet-flooding being an annual feature in this lowlying region, most of the villages between Dholka and Moti Boru including Bagodara, Dhingra, Koth, Gangad, Bhurkhi, Gundi, Laximpura, Saragwala, Samani, Bholad and Nani Boru are cut off from one another during the monsoon. Perched on artificial mounds they look like small islands in a vast sea. The Lothal mound itself is surrounded by a sheet of water, 4 to 5 feet deep (pl. IIIA), for nearly three months in the year. The spring tide overflowing the Nal Lake enters the shallow creek between Bagodara and Koth finally finding an outlet to the sea through one of the ancient flow-channels of the Sabarmati, namely the Sewlo, two miles east of Lothal (fig. 20). The bed of a river anciently flowing on the western margin of the mound is indicated by a natural depression in north-south direction (pl. IA). At high tide, the sea water enters the Bhogava near Samani and overflows into the old river bed. The two channels, one on the east and the other west of Lothal, were once connected by a nullah the traces of which can still be seen along the northern edge of the mound. After running for some distance in the east-west direction (pl. I) it takes a turn to the south before joining the depression on the western margin of Lothal. The aerial photographs of the mound and its adjacent areas taken in 1958 before the dock was exposed reveal a shallow river-bed on the west, a nullah on the north and a bowl-like depression on the east. A close study of the toposheets shows a depression extending west of Saragwala and Samani until it meets the Bhogava river near Bholad. Apparently, Samani and Koth were anciently connected by a river flowing *via* Laxmipura and Lothal. Another depression noticed along the newly laid Jawarat-Saragwala road, about a mile east of Lothal, meets an ancient flow-channel near Koth (lat. 22° 38′ N, long. 72° 18′ E) marking the second stage of the same river. It is therefore highly probable that the river washing the western edges of the early Harappan settlements at Lothal and Koth took a swing to the east some time later. The residents of Bholad still recall that about 80 years ago boats used to reach upto Lothal from Moti Boru which is accessible to countrycrafts even now. The tidal waves which rise as much as 10 ft. high in the Bhogava river near Bholad must have enabled the boats to sail upto Lothal through one of the flow-channels mentioned above.

C. Flora and Fauna

The average annual rainfall of Bhal is 30 inches, but sometimes it is as heavy as 45 inches. The major crops are cotton and wheat, but rice is also grown near Bavla. With standing crops, the region around Lothal looks like a green carpet in winter, but in summer, the blazing sun scorching the salt-laden treeless waste produces a mirage as if mocking at the monsoon floods.

[1] *Imperial Gazetteer of India, Bombay Presidency* (Calcutta, 1901), II, p. 348.

The plant-remains from the excavations at Rangpur and Lothal suggest that Bhal (Ch. XXV) was wooded with medium-sized and large trees, shrubs and grasses in protohistoric times. A dry deciduous type of vegetation including thorny trees such as *Accacia,* and fruit-yielding trees e.g. *Tamarix* covered the region. Teak grew in the neighbouring hills. The climate and vegetation have not changed much during the last three thousand years, except for the fact that there were more swamps allowing profuse growth of tall grass and reeds, as in the Nal Lake. Although it may be conceded that the plains are slightly more arid today owing to biotic factors as well as denudation and erosion,[1] the gradual dessication may have contributed to a small extent for the desertion of Harappan settlements in Kathiawar and Sind. As pointed out by Raikes, Sind, and by analogy Kathiawar too, was not very densely wooded in protohistoric times[2].

As regards the crops grown in protohistoric times definite evidence of rice and *bājrā* have been found at Lothal and Rangpur. The textile impressions found on the clay sealings and the plant-motifs painted on pottery suggest that cotton was also known.

The type of vegetation growing around swamps must have been congenial to rhinoceros and other animals. The archaeological evidence from Lothal in the form of skeletal remains of an elephant confirms the literary evidence regarding the existence of this animal in Saurashtra in ancient times.

2. THE MOUND

The present mound at Lothal is ovoid on plan with its longer axis measuring 934 ft. from north to south, and the shorter one 749 ft. from east to west. However, the ancient town was much larger in extent than what is suggested by the mound which is now reduced in size owing to erosion and silting up of its slopes during the last 3000 years. The structural remains and painted pottery found 1000 ft. south of the mound suggest that the township actually had extended far beyond its present boundaries. While Harappa and Mohenjo-daro are roughly 3 miles each in circuit, Lothal appears to be not more than one mile and a quarter i.e., slightly less than half the size of Mohenjo-daro, but it must be noted here that Harappan potsherds and bricks have been found a furlong south-east of the Lothal tank, and a brick-built well was also noticed in a field two hundred yards east of the dock, thus increasing the possibility of finding extensions of the town to the east and south-east of the dock.

The mound looks much dwarfer than it actually is because of a thick alluvial deposit on the slopes. Except in the southeastern and southwestern corners where the fall is steep, the mound slopes gradually on all sides from a flat terrace measuring 560 ft. from north to south and 230 ft from east to west (pl. IV). Three rain-gullies, one cutting up the south-

[1] S. S. Ghosh and Krishna Lal, 'Plant remains from Rangpur', *Ancient India,* nos., 18 & 19 (1962-1963) pp. 161-71.

[2] R. L. Raikes, 'The end of ancient cities of the Indus', *American Anthropologist,* 66, 2 (1964), pp. 284-99.

western corner, another the southern slope and the third one the southeastern corner, were visible before the commencement of the excavation. Ravages of nature and man have been responsible for the destruction of brick structures built at the foot of the mound. What little remains is hidden under a thick deposit of silt. It is relevant to record here a local tradition regarding Lothal, which is considered a sacred place for Vāṇuvatimātā, the sea-goddess who is represented by stones placed in a small enclosure of bricks built in the south-east corner of the mound. It is here that a warehouse stood in Harappan times. Some old people in Samani and Bholad villages told the writer that Lothal was till recently a port visited by country crafts bringing timber, etc. and that they used to be moored in the creek near Lothal tank which is now silted up.

3. HISTORY OF EXCAVATIONS

With a view to understand the cultural sequence of Lothal the first trench SRG 1 was laid in February 1955 in the highest part of the mound where the occupation deposit was expected to be the maximum. Here 'SRG' stands for the village Saragwala, in the revenue jurisdiction of which the Lothal mound is situated. After digging a couple of feet deep, a tiny steatite seal bearing a single Indus sign and a bird motif (pl. CLIX-C3) was discovered. In quick succession came more seals and beads, chert blades and weights, copper tools and earthenwares, all characteristic of Harappa Civilization. The primary object of ascertaining the cultural sequence was achieved after reaching the natural soil at a depth of 21 ft. in this trench. The association of Indus seals at Lothal with the red and buff painted wares similar to those found in Period IIA of Rangpur has removed doubt about the latter site being a true Harappan settlement. It incidentally explains the occurrence of the Buff Ware as an additional ceramic product of the Harappans in Saurashtra. In view of the encouraging results it was decided to resume the excavation which was temporarily suspended in April 1955. Henceforth, the excavations were conducted on a large scale throughout the year except during the rainy months and the operations aimed at exposing the houses of the town in each phase separately. For this purpose the mound was divided into two main sectors, one to the north of SRG 1 and the other to the south, the former being designated as SRG 2 and the latter SRG 3. Both were gridded into 15 ft. squares. In 1956 SRG 3 was extended further to include a relatively isolated mound in the south-east corner (pl. IIIB), which fortunately turned out to be the warehouse of the town. Before extending the operations to this sector the stones in worship representing the sea-goddess had to be removed against the wishes of the labourers. A few days later there was an accident resulting in injury to some labourers and the death of one of them. Immediately the workers attributed the accident to the sacrilege committed by us in removing the goddess from her original place of worship, and refused to work on the site. They were later satisfied when the goddess was re-installed elsewhere with some ceremony. This incident is particularly mentioned here to show how strong is the tradition of worshipping the sea-goddess at Lothal. It is necessary to note here that the original seat of the goddess was the warehouse-mound overlooking the dock. She is invoked even now to protect the sailors from the dangers of the sea.

There is a shrine dedicated to the sea-goddess (Veṇuvatimātā) on a similar mound at Gogha, an early historic port near Bhavnagar.

A memorable day in the annals of the excavation at Lothal was the one on which as many as fifty terracotta sealings were found within two hours in a small area of 3 ft. square in one corner of what was then called a 'kiln'. As the reward offered to labourers for finding a seal or sealing was a rupee they were overjoyed to find so many in such a short time. The discovery of the terracotta sealings bearing impressions of the packing material was highly significant in another respect too. It established that Indus seals were used in export-import trade for sealing cargo. The occurrence of so many sealings also proved that Lothal was an important commercial centre. By the end of 1956, the excavation had made sufficient progress to throw light on town-planning, but there was no clue to the funerary methods adopted by the Lothal people. It was therefore decided to tackle this problem also by probing the northwest corner of the mound. The efforts made in this direction met with success at the end of the season when two burials were discovered. In the subsequent years, the cemetery area was thoroughly examined and the available burials were exposed. A substantial wall of kiln-burnt bricks was noticed in this season on the eastern margin of the mound over a length of 72 ft. Hence, the excavation had to be resumed in 1957 to ascertain the full extent of the wall and the purpose of its construction. It turned out to be the largest brick structure ever built by the Harappans and enclosed a trapezoid basin measuring, on an average, 720 ft. from north to south and 120 ft. east to west. The subsequent identification of the structure as a dock raised a controversy which ended only after adducing further evidence in later years.

4. THE PROBLEMS

A. Harappan Affinities

The main purpose of undertaking excavation at Lothal was to decide whether it could be considered as a true Harappan settlement where the people observed the same urban discipline and enjoyed the same material prosperity as in the metropolitan centres of Harappa and Mohenjo-daro. This object was achieved as soon as typical Indus weights, seals and painted pottery were found in the first season of the excavation. The careful planning of the town and the excellent sanitary system existing at Lothal proved beyond doubt that it was a true Harappan town.

B. The Dock

The second problem which had to be tackled at Lothal is peculiar to the site on account of its situation. This relates to the identification of a trapezoid brick-walled structure, the largest ever built in any Harappan site. The purpose of enclosing a vast basin with massive walls and providing an inlet channel and a spill-way, besides erecting a 800 ft. long platform, was not clear in the beginning, but when other details were available the structure was identified as a dock built for sluicing ships at high tide and for hauling cargo.

As a sequel to this identification it became necessary to determine how the ships reached the dock from the Gulf of Cambay. After much probing two ancient river beds and nullahs were located. The discovery of stone anchors and marine shells within the basin itself put an end to the controversy as to whether Lothal was connected with the sea and whether boats used to be anchored here. The identification of the trapezoid structure as a dock, presence of painted pottery of Sumerian origin and the occurrence of a Persian Gulf seal at Lothal have given a new emphasis to the maritime activities of the Harappans. It will not be a surprise if similar docks are discovered at other Harappan ports in Gujarat, namely Gogha Mehgam and Bhagatrav.

C. Warehouse

The third problem relates to a series of cubical blocks of mud-bricks built on a massive podium. Initially it was found difficult to determine its use. Later on it was ascertained that the structure served as a warehouse wherein cargo was examined and stored.

D. Devolution Of The Harappa Civilization

The fourth problem concerns the occurrence of evolved Harappan ceramic wares comparable with those of Rangpur IIB-IIC in the late levels of Lothal. It was fairly evident at Rangpur that the Lustrous Red Ware Culture was a direct descendant of the Harappa Civilization and did not represent any alien culture, but certain doubts expressed about the devolution of the Harappa Culture had to be cleared. The absolute dates based on Carbon-14 determinations and the stratigraphic and ceramic evidences have proved beyond doubt that there was no break in the occupation of Lothal nor in its cultural traditions (below p. 28 ff). It is also clear that the new ceramic forms and decorations of the late levels of Rangpur (IIC) and Lothal (Period B) are directly evolved from the Harappan ceramic wares. Rojdi, Prabhas and Machiala Mota are other Late Harappan sites where the devolution of the culture becomes apparent.

E. Pre-harappa Culture

Lastly, the Micaceous Red Ware Culture deserves mention although its claim as an antecedent culture is not yet fully established. The Micaceous Red Ware with its distinct forms and decorative motifs, which the Harappans also borrowed, occurs in large quantities along with the Red Ware of Harappa in the early levels of the main mound at Lothal. At the foot of the mound it is found in larger quantities in inverse proportion to the Harappan wares as one reaches the earlier levels upto 10 ft. below the present water table, but the subsoil water has prevented digging in a sufficiently large area to confirm occupation by a purely Micaceous Red Ware-using folk before the advent of the Harappans. The exuberance of the Micaceous Red Ware in the early levels and its strong influence on the Harappan wares suggest that the Micaceous Red Ware folk were indigenous to the soil and had attained a fairly high level of economic development.

CHAPTER III

CULTURAL SEQUENCE

1. INTRODUCTION

The two facets of the Harappa Civilization at Lothal, one representing its maturity and the other its decadence, have been designated as Period A and Period B respectively instead of Period I and Period II. To distinguish the cultural periods from the structural periods the latter have been termed as phases. Accordingly, the four phases of building activity noticed in Period A are numbered from bottom I to IV, while the only one in Period B is designated as Phase V. There are three sub-phases in phase II, and two each in phases III, IV and V.

The following cultural periods, structural phases and their sub-phases may be noted before going into details:

Period B Late Harappa	Sub-phase VB	Phase V
	Sub-phase VA	
Period A Mature Harappa	Sub-phase IVB	Phase IV
	Sub-phase IVA	
	Sub-phase IIIB	Phase III
	Sub-phase IIIA	
	Sub-phase IIC	Phase II
	Sub-phase IIB	
	Sub-phase IIA	
		Phase I

Lothal was not a cultural vacuum when the Harappans arrived here. It was a small village standing on a river bank and occupied by an indigenous Chalcolithic folk who used a distinct ceramic ware which is christened here as Micaceous Red Ware on account of its colour and micaceous surface. The earliest occupation deposit of phase I, which is as much as 3 to 4 ft. in the Acropolis area and more than 10 ft. below the subsoil water level at the foot of the main mound in SRG 30, has yielded an increasing quantity of the Micaceous Red Ware in the lower levels with a corresponding decrease in the Harappan

wares. Secondly, the Micaceous Red Ware people had so firmly established themselves at Lothal that the Harappans could not ignore them. In fact the indigenous ceramic forms and decorative motifs were copied in the Harappan wares within a short time. The existence of a well-developed autochthonous culture in Saurashtra before the advent of the Harappans explains the occurrence of stud-handled bowls in the Micaceous Red Ware, reproduced later in the Harappan wares at Lothal, Rangpur, Rojdi and Somnath. It is again the Micaceous Red Ware folk who had developed the inverted firing technique which accounts for the presence of the black-and-red ware in the Saurashtrian Harappa sites.

What attracted the Harappans to a relatively remote place like Lothal can be guessed with a fair degree of accuracy. Before actually settling down here they must have had trade contacts with Lothal, the main products exchanged being cotton or cotton goods, gemstones, ivory, metal tools, etc. Besides the sheltered harbour, the rich hinterland yielding cotton,rice and wheat and with easy access to the sea, the opportunities for controlling the sources of supply of luxury goods, which were in great demand in the west, must have been too attractive to be ignored by the sea-fearing Harappans. Their arrival and settlement in phase I appear to be a slow and peaceful process, for, there is no evidence of violence, nor any sudden influx of the newcomers. After their arrival they gradually introduced their ceramic wares, lithic tools and metal equipment. The local population must have gladly adopted the superior tools and weapons as also the new standards of weights and measures because of the advantages they conferred. The Harappans do not appear to have made serious attempts to introduce civic amenities such as public drains and wells in Phase I. They had to wait until an opportunity presented itself after the destruction of the village by a flood when overall planning became a necessity for adopting more lasting devices to protect the village from heavy floods.

The Harappans must have prepared a blueprint of the proposed town before providing all the civic amenities. The neatly laid out platforms, streets and drains, the provision of public wells, the separation of the industrial area from the residential localities, the arrangement of houses in rows, the erection of peripheral walls of uniform width and, more than all, the construction of the dock, wharf and warehouse clearly suggest careful planning and efficient execution with utmost precision. Execution of public works on so large a scale could not have been possible but for a leader-genius who could enlist the co-operation of the inhabitants and organize and direct the skilled and unskilled labour. As he was held in high regard he occupied the best mansion having civic amenities and built on the highest platforms so that the seat of authority could appear impressive. It was well protected against natural calamities. The 'Acropolis', so designated because of its function and as a seat of authority, is situated in the southwestern corner of the town overlooking the dock. The Lower Town, where merchants, craftsmen and others lived, also enjoyed all civic amenities.

The most striking feature of the Harappa Civilization is its homogenity. Uniform products of the Harappan craftsmen and artists can be found in all the cities and towns throughout the vast territory which came under its influence. Having realized the advantages of standardization, the Lothal people produced tools, weapons and ornaments

conforming in quality and form to the standards obtaining in the Indus valley. This explains the occurrence at Lothal of *intaglio* seals, cubical stone weights, parallel-sided blades of chert, copper tools and weapons, beads of gold and gemstones, bangles and rings of shell and copper and earthenwares which closely resemble those from Harappa and Mohenjo-daro. This uniformity is often mistaken for conservatism which is said to have killed initiative. This is not true at least in the case of Harappan craftsmen in Saurashtra. Underlying this uniformity there is a strong current of divergence emphasising the provincial character of the Harappa Civilization in Saurashtra which evolved new artistic traditions, religious rites and funerary customs. The Lothal craftsmen exhibited originality of thinking and great resourcefulness. As an example we may mention the new style of painting earthenwares with animal motifs which are more realistic than those on the Indus valley pottery. At the same time the metropolitan (Indus) style was also in vogue along with a new (Provincial) style in the mature phase of Harappa Civilization. While the craftsmen invented new tool types such as the curved saw and twisted drill of copper or bronze, the Lothal merchants introduced a new standard of weights besides the binary Indus system perhaps to be in conformity with foreign standards. These are a few instances of the initiative taken by the Lothal folk. In religious matters too they had independent thinking. They worshipped the Fire God but did not adopt the Indus valley cult of the Mother Goddess. In glyptic art the representation of the human was not popular. A section of the Lothal population practised joint burials which are unknown in the Indus valley. These divergences in the artistic traditions, religious beliefs and social customs of the Harappans in Saurashtra should be attributed partly to the influence of local traditions and partly to the overseas trade. It must, however, be remembered that the Lothal people did not blindly copy whatever they saw in the foreign lands which they visited in the course of trade. They skilfully adapted them to suit their tastes as in the case of painting vessels. In fact they made no concessions in the major fields of their activity. Despite some variations, it must be admitted that the bulk of the artefacts used by them adhered to Indus standards in form and content.

Lothal made a substantial contribution to enrich the Harappa Civilization in scientific and technical fields. It is now established that the Lothal engineers were pioneers in constructing an artificial dock for berthing ships. Nowhere else in the world had maritime engineering advanced so much in the third millennium B.C. as at Lothal. It is again the surgeons of Lothal who could trephine the skull perhaps with a view to operate on the brain. They invented a scientific instrument comparable to a modern compass for measuring angles. Among other improved tools mention may be made of a circular saw, the twisted drill and the planer-bit produced for the benefit of carpenters, coppersmiths and shipwrights. But the Harappans were indifferent to the improvement of offensive weapons. As a peace-loving people, they had perhaps no need for them.

The prosperity of the Harappans witnessed in phases II and III shows faint signs of decline in phase IV after the great flood which struck down the inhabitants in *circa* 2000 B.C. Yet another flood in *circa* 1900 B.C. spelt ruin for the town. But what distinguishes Lothal from Harappa is the survival of the Harappa Civilization in Gujarat long after its extinction in the Indus valley. The decline in the urban discipline of Lothal which began

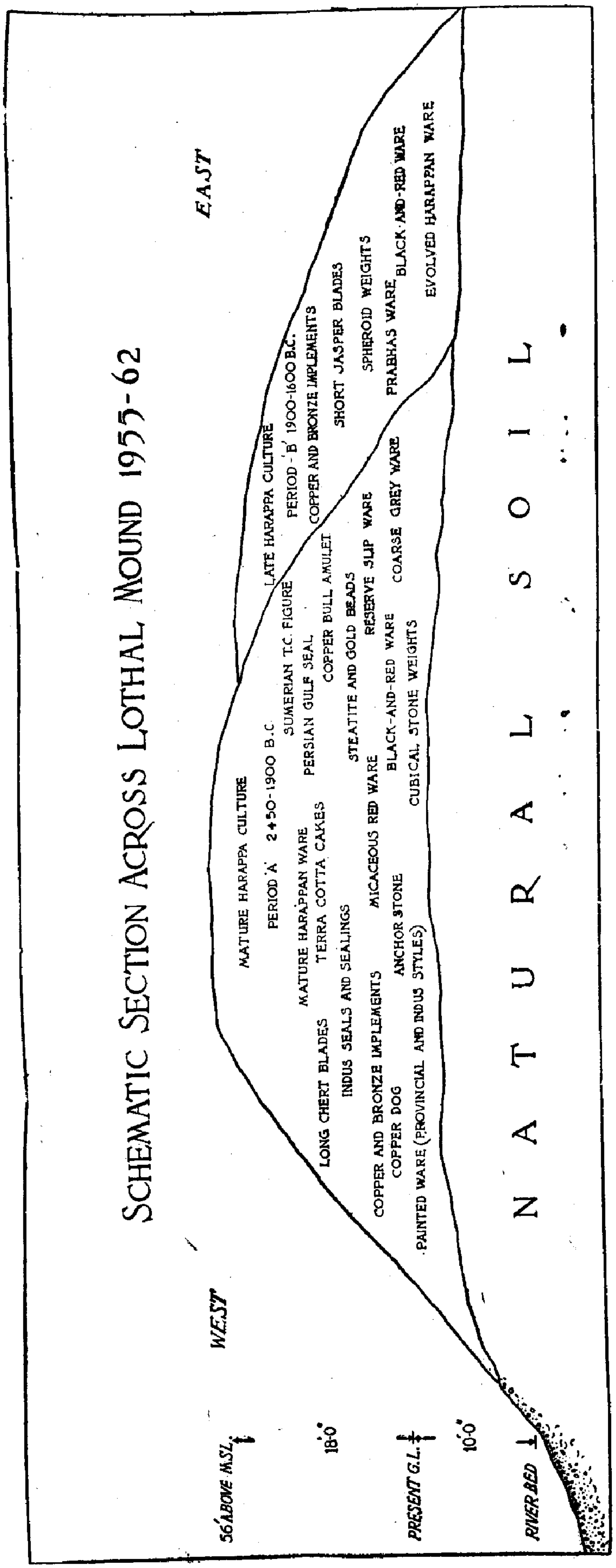

SCHEMATIC SECTION ACROSS LOTHAL MOUND 1955-62
WEST
EAST
56' ABOVE M.S.L.
18'-0"
PRESENT G.L.
10'-0"
RIVER BED
MATURE HARAPPA CULTURE
PERIOD 'A' 2450-1900 B.C.
MATURE HARAPPAN WARE
TERRA COTTA CAKES
LONG CHERT BLADES
INDUS SEALS AND SEALINGS
COPPER AND BRONZE IMPLEMENTS
COPPER DOG
ANCHOR STONE
MICACEOUS RED WARE
PAINTED WARE (PROVINCIAL AND INDUS STYLES)
SUMERIAN T.C. FIGURE
PERSIAN GULF SEAL
COPPER BULL AMULET
STEATITE AND GOLD BEADS
RESERVE SLIP WARE
BLACK-AND-RED WARE
CUBICAL STONE WEIGHTS
COARSE GREY WARE
LATE HARAPPA CULTURE
PERIOD 'B' 1900-1600 B.C.
COPPER AND BRONZE IMPLEMENTS
SHORT JASPER BLADES
SPHEROID WEIGHTS
PRABHAS WARE
BLACK-AND-RED WARE
EVOLVED HARAPPAN WARE
NATURAL SOIL

FIG. 5

in phase IV was accelerated in phase V. With its economy shattered and trade brought to a standstill, Lothal ceased to be a port of any importance. The manufacturing industries such as metal-working and bead-making, which once flourished here, disppeared almost completely. The overall degeneration of the Harappa Civilization becomes apparent from the jerry-built houses and the poor material equipment of the people. The town was reduced to the position of an ill-planned village lacking essential civic amenities. The huts were built of reeds and mud, and there were no public drains. The ceramic wares consisted of ill-fired and poorly-decorated jars and bowls, while tools and ornaments made from imported materials became very scarce. Trade came to a standstill because dock and warehouse were destroyed beyond recognition. This is the picture that one gets at the beginning of phase V.

It is however refreshing to find that gradually the inhabitants did make an effort to improve their economic condition. They made use of the locally available materials and produced the required tools. In this process they evolved new traditions slowly discarding some of the earlier ones. But the very fact that the Harappa Civilization survived in Saurashtra much longer than in the Indus valley and gradually transformed itself into the Lustrous Red Ware Culture through Lothal B and Rangpur IIC-III shows the vitality of the civilization.

With these introductory remarks, we may now take up detailed consideration of the material equipment of Periods A and B.

2. PERIOD A

A. Phase I

Based on structural evidence Period A is subdivided into four phases. In the early levels of phase I the indigenous culture is more dominant than the Harappa Culture, for, the Micaceous Red Ware, the black-and-red ware and the coarse grey ware are found in much larger quantities than the Harappan ceramic wares such as the Red Ware and Buff Ware. In both the cases the pottery is well fired and the shapes are well formed. Painted vessels are more numerous in the Micaceous Red Ware than in the Harappan wares. But, in the late levels of phase I the Harappan wares are found to improve in quality as well as quantity. The occurrence in phase I of several Indus objects such as steatite seals, cubical stone weights, long parallel-sided blades of chert, disk beads of steatite and shell, copper fish hooks and ceramic forms such as the vase (fig. 46, *30*), goblet (fig. 46, *32* and *33a*), beaker (fig. 46, *35*), cylindrical jar with multiple perforations (fig. 45, *26*; fig. 57, *94*), tall jar with S-shaped profile and ledged rim (fig. 41, *9*), dish-on-stand (fig. 47, *37b*; fig. 48, *42b* and *42g*), jar with a bulbous body (fig. 44, *14*) and basin (fig. 55, *83*), suggest that the Harappa Culture had attained maturity by the time it reached Lothal. The decorative motifs painted in black over red occurring in Period A as a whole include the pipal leaf, intersecting circles, rosettes and peacocks (fig. 42, *9a*), semi-naturalistic forms such as the palm (fig. 74, *A19* and fig. 75, *A25*) and derivative leaf-patterns (fig. 75, *A31* and *A35*) all

rendered in the Indus manner. The goblet with a pointed base occurs in the late levels of Period A, but not in the early levels. It is only in Period B that the true Harappan ceramic wares undergo a visible change, but the pottery and other artefacts from Period A listed above cast no doubt as to the maturity of the Harappa Culture at Lothal. The occurrence of plant forms such as the wheat-chaff 'in a less Harappan manner' (pl. CLXXIV A), the free style of painting cranes and fish-eating starks (pl. CLXXI B) and the depiction of 'caprids in outline of a more realistic kind than is normal to the Indus valley'[1] do not indicate a late date, but a Provincial Style of painting developed in the mature phase. On the other hand, the Carbon-14 dates for these levels clearly demonstrate the contemporaneity of Lothal A with the intermediate levels of Mohenjo-daro. These motifs noticed side by side with the characteristic Harappan motifs painted in the conventional way were the result of a happy blending of various influences to which Lothal was subject. To quote an example, a large jar is painted with intersecting semicircles hatched into leaf patterns, a frieze of sun motifs in a cross-hatched panel and squares divided into alternately hatched triangles, all in the typical Harappan style. The Provincial Style is also introduced by painting animals and trees in other panels (fig. 41, *9*) on the same vessel. A late date suggested for Lothal may be applicable to Period B when new ceramic types and motifs were evolved from the true Harappan.

B. Phase II

The destruction of the small village settlement in phase I by the flood-waters did not chill the enthusiasm of the inhabitants of Lothal. On the other hand, with their co-operation the leader-genius could ensure better planning of the town and greater security against natural calamities. The damaged peripheral mud wall was strengthened and enlarged with mud-bricks on the southern, eastern and western sides and reinforced with burnt bricks on the northern margin, where the *nullah* posed a greater threat to the safety of the town. The houses were raised on artificial platforms of varying heights built of mud-bricks and mud. The Acropolis, which appears to have been the seat of power, stood on a 14 ft. high platform at the southern end of the town and enclosed within its walls three blocks, one of which was built overlooking the dock and used as a warehouse for stacking cargo. Immediately to the east of the Acropolis lies the dock, a trapezoid brick-built structure. The excavated earth from the basin was used for making millions of mud-bricks and for filling the box-like enclosures with a view to raise the working level of the Acropolis and Lower Town. As in Mohenjo-daro, the layout of the entire town was based on a gridiron plan with main streets running north-south and east-west (pl. XXXVIII) connecting all the blocks. The sanitary arrangements were excellent. A complicated system of underground drains served the Acropolis, while the Lower Town had a few surface drains and soakage jars. All the drains, cess-pools and soakage jars must have been periodically cleaned, which presupposes an efficient municipal administration.

[1] Sir Mortimer Wheeler, *The Indus Civilization* (Cambridge, 1968), pp. 78-79.

Reconstructions and additions had to be made in sub-phases IIb and IIc in the Acropolis on account of the subsidence of houses due to floods. Generally, the house consisted of 3 to 4 rooms including a spacious kitchen. The bath was paved with burnt bricks (pl. XLII A), and the streets flanked by houses varied in width from 10 to 22 ft. In addition to the enlargement and planning of the residential part of the town the fast expanding sea-borne trade fed by the developing industries necessitated provision of better berthing facilities for ships. Hence, the inhabitants built a massive artificial dock with water-locking arrangements and thereby exhibited extraordinary skill in marine engineering. The construction and maintenance of public works such as the dock, drains, warehouse and peripheral walls and the strict enforcement of rules presuppose co-operative effort on the part of the inhabitants and an overall control by an authority. Perhaps, this authority needed no divine sanction. Under his guidance Lothal soon developed into an important industrial centre where shell-workers, bead-makers and coppersmiths established factories. Semiprecious stones were imported from Bhagatrav (lat. 21° 29′ N; long. 72° 42′ E), another Harappan port in the Kim estuary, and processed into beads at Lothal. Chank-shell, which was easily available off the Kathiawar coast, was worked into bangles, beads and inlays for domestic and export purposes. Ivory was also available locally as is evident from the skeletal remains of the elephant found in the excavations. Copper was imported and worked into tools and ornaments. The exports included ivory, stone beads and perhaps, cotton goods too.

The prosperity of the town is reflected in the exuberance of the Harappan ceramic wares, especially the painted vessels, in phases II—III, when the Buff Ware and Red Ware were more popular than the Micaceous Red Ware. 'S'-shaped vessels with a flanged rim, cylindrical perforated jars, dishes-on-stand, beakers and basins are more numerous in phases II—IV than in phase I. The vase makes its first appearance in phase II, but the pointed goblet occurs in phase IV only. Local types such as the bowl with a stud-handle and the globular jar with a flaring rim in the Micaceous Red Ware, the bulbous jar with a flaring rim in coarse grey ware and the bowl with or without the stud-handle in the black-and-red ware did not decrease in number to any appreciable extent in phase II. Vessels painted in the Provincial Style however occur in late levels of this phase.

Etched carnelian beads, segmented beads of faience, disk-beads of gold, shell-inlays, ivory rods, bone pins, copper chisels and fish hooks, chert blades and cubical weights are other artefacts of the mature Harappa Culture found in phases II—IV.

A multiplicity of beliefs and observances is noticeable in the religion of the Lothal folk. While on the one hand the rectangular mud-brick enclosures built for fire-worship suggest metaphysical aspects of the religion, the cruder forms of animism such as serpent-worship are not wanting here. Such a duality was on the increase in later phases when rituals assumed more complicated forms. The conspicuous absence of seals bearing human and semi-divine forms and the utter scarcity of Mother Goddess figures may indicate that certain religious rites which were common in the Indus valley were not popular at Lothal. In spite of the divergences in ceramic traditions and religious beliefs of the Lothal folk the overall picture produced by the large assemblage of pots and pans,

seals and sealings, tools and weapons, ornaments and toys, buildings and roads is one of a mature and prosperous Harappan town. The close co-operation between the original inhabitants and the Harappans brought in many benefits to both. Increased trade with the Indus valley and Sumerian cities resulted in greater material prosperity. The comforts of an urban life were enjoyed by both the groups. But it must be admitted that the Harappans played a more dominant role now than they used to do earlier.

C. Phase III

A flood of considerable magnitude destroyed the town in phase II and the massive mud-brick platforms on which the ruler's mansion stood were greatly damaged. Undaunted by the calamity the residents not only extended the habitation area but also rebuilt houses on platforms which had to be raised further in height. The opulence of the inhabitants can be gauged from the increase in the number of spacious houses and industrial establishments, better civic amenities and exuberance of costly ornaments and imported goods. Sea-borne trade was at its height during this phase.[1] Among objects of foreign origin mention may be made of the 'Persian Gulf seal', the Reserved Slip Ware (pl. CLXXXIV A), a copper amulet with a couchant bull, a terracotta human figure with Sumerian features and clay labels bearing impressions of foreign seals. At the height of its prosperity Lothal exchanged goods with Susa and Ur, Perisan Gulf islands and Indus cities on the one hand, and the southern towns on the west coast on the other[2]. It imported chert from Sukkur-Rohri or upper Krishna region, agate from the Narmada and Tapti valleys, certain varieties of shell from the southern seas, and perhaps copper ingots directly from Susa or through the Persian Gulf. Indian merchant-colonies established at Bahrain, Susa, Ur, Brak, Kish and in the Diyala valley might have included the citizens of Lothal too.

The inventive genius of the Lothal folk is revealed by an instrument comparable to the modern cross-staff made of shell and used in surveying lands and measuring angles. A bronze auger or twist-drill is another example. New religious beliefs such as those suggested by joint burials and animal sacrifice assumed prominence during this phase.

A flood of great intensity and long duration destroyed Lothal at the height of its prosperity in *circa* 2000 B.C. The Lower Town was completely submerged and the dock, Acropolis and warehouse were damaged. Successive layers of flood-borne debris, silt and sand accumulating to a thickness of 4 to 5 ft. over the ruined buildings bear testimony to the havoc wrought by the flood at the end of phase III, as a result of which some of the inhabitants migrated to safer regions in the interior of the peninsula.

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[1] S. R. Rao 'A Persian Gulf Seal from Lothal, *Antiquity*, *XXXVII*, June, 1963 (Cambridge) pp. 98-99,

[2] S. R. Rao 'Shipping and Maritime Trade of the Indus People' *Expedition*, 7, no. 3 (Philadelphia, 1963), pp. 30-37.

D. Phase IV

Some people however returned to Lothal immediately after the recession of the flood-waters to rebuild their houses. But there was a great contrast between the present half-hearted measures taken on individual initiative and the co-operative effort organized on a large scale under the direction of a great leader in phases II and III. It was then possible not only to plan and build public works, but also to mend the damages immediately. But now no attempt was made even to clear the town of the enormous quantity of flood-debris or to raise the height of the platforms as a further precaution against any future floods. Sufficient care was not taken to provide sound foundations for the new buildings, nor was any protective wall raised against inundation. No public drains were constructed to carry sullage water and the general standard of construction was poor. The ill-paved baths, the unregulated constructions and the encroachments on streets during phase IV prove that the ruler who once exercised effective control and rehabilitated people was absent. In short, the Lothal folk were leaderless. Bone-workers and other artisans built rickety houses on the ruins of the Acropolis where once the grand mansions of the ruler and the nobility stood. The inhabitants did not find any necessity to rebuild the warehouse. The river which used to flow on the western margin suddenly changed its course to a distance of one mile east of Lothal after silting up its original bed, thus blocking the entry of ships into the dock through the northern inlet. This necessitated digging a new inlet-channel connecting the river with the dock and providing an inlet in the eastern embankment to sluice small ships. Simultaneously, some of the breaches in the embankment were also mended.

In due course, however, the mercantile community of Lothal seems to have made one more effort to revive trade. It established some factories for manufacturing copper and bronze implements, beads of gemstones and shell. A bead factory having a large open courtyard, a working platform surrounded by a closed gallery and some rooms for workers (pl. XC) is found constructed on the flood-debris accumulating close to the Acropolis. Besides a large number of beads of carnelian, chert and other semi-precious stones in various stages of manufacture, two pots containing finished beads were found in the bead factory. A small circular kiln with four interconnected flues built nearby must have been used by the lapidaries. On the northern margin of the town the coppersmiths melted the imported ingots of copper and fashioned them into tools to meet the requirements of the lapidaries, carpenters and smiths. All that now remains of the coppersmith's workshop is a furnace providing evidence of melting ingots and casting the metal into sheet. The pot-kilns noticed near the furnace suggest that several coppersmiths worked under a common roof. Apparently the middlemen or merchants must have employed the lapidaries and smiths to produce goods for domestic consumption and export. Among other establishments assignable to phase IV mention may be made of shops belonging to a coppersmith, a lapidary and a shell-worker, all situated in the central sector of Street 1. The Acropolis which was now occupied, among others, by ivory-workers and bone-workers completely lost its importance.

The general decadence of the Harappa Culture at the end of phase IV is reflected in the ceramic wares also. The fabric of the Harappan vessels was poorer owing to imperfect firing and presence of impurities in the paste. Consequently, the vessels were coarser and less impervious to water action. Very few vessels had a thick slip covering the striations. In many cases the decoration consisted of simple horizontal lines over a limited surface. This does not however mean that no sturdy vessel was in use or that vessels painted in the characteristic Indus Style were totally missing. A few sturdy vessels treated with a thick slip and attractively painted with derivative leaf-patterns, peacocks, palms and cross-hatched panels in the Indus Style continued to be in use. The use of goblets, beakers, perforated cylindrical jars and 'S'-shaped vessels was limited. The convex-sided bowl, both in the Micaceous Red Ware and the Harappan Red and Buff Wares, show a tendency towards straight sides (fig. 52, *64b*), while the small bulbous jar developed a slightly raised neck. The projected rim of the dish became slightly shortened. Excepting these minor changes no other ceramic type underwent any appreciable change during the hundred years covered by phase IV. Certain naturalistic motifs such as the crane and the fish-eating bird continued to be painted in the Provincial Style. The wavy lines came to be isolated from other naturalistic and geometric designs and were occasionally the only motifs painted on the vessels. This tendency to simplify the complex designs assumed prominence in Period B.

Before the Lothal folk could recover from the heavy blow struck by the flood and develop their shrunken town into a large trading centre, another flood, rather a deluge, struck one more blow in *circa* 1900 B.C. The houses built in phase IV on flood-debris without proper foundations and using weaker mud-bricks collapsed and dissolved into a mass of earth leaving hardly any trace of the superstructure. The destruction of the dock was complete, and with the silting up of the basin, even small boats could not be berthed. The remnants of warehouse blocks were heavily eroded. To escape the wrath of the floods the inhabitants had to flee once again to safer regions in the interior.

3. PERIOD B, PHASE V

A word may be said about the flood which devastated Lothal at the end of phase IV. It appears to have been a widespread calamity which befell the Harappan sites not only in Kutch, Kathiawar and South Gujarat but also in the Indus valley. There is ample evidence of destruction in Gujarat in the form of flood debris capping the Harappan sites at Koth, Lothal and Bhagatrav. So far as the Indus valley goes, the 40 ft. high hill of silt at Budh Takkar in Sind referred to by M. R. Sahni[1] suggests that a great flood of long duration turned the Indus valley into a vast lake, which explains the destruction of Chanhu-daro as noted by the excavator. Perhaps Mohenjo-daro was also affected by a similar calamity. To escape death and destruction the Harappans seem to have migrated to different places, those living in the lower reaches of the Indus seeking shelter in Kutch and Kathiawar,

[1] M. R. Sahni, *Man in Evolution* (Calcutta, 1952), pp. 153-154.

and the inhabitants of the middle and upper courses fleeing for safer places in the Ghaggar and Sutlej valleys. They are known to have reached as far east as Alamgirpur in the Ganga Yamuna doab[1]. The uprooting of the Harappans from their homeland resulted in cultural fragmentation and a steep decline in their material prosperity for want of economic support. Having lost the original moorings they wandered in search of new ones in the Ghaggar and Sutlej valleys. After lingering for sometime more in poverty-stricken conditions they completely lost their identity.

The Harappan refugees who fled the lower reaches of the Indus valley landed at the estuarine ports, the chief among them being Todio (23° 05′ N, 68°55′E) in Kutch, Dwaraka and Amra (22° 26′N, 69° 56′E) near Jamnagar, Kindarkhera (21° 48′N, 69° 33′E) near Porbandar, Prabhas (20° 53′N, 70° 22′E) near Veraval and Kanjetar (20° 45′N, 70° 40′E) near Kodinar in Kathiawar and Mehgam (21° 42′ N, 72°45′ E,) in South Gujarat (fig. 3). These coastal settlements were small and did not last long owing to the limited resources which could not sustain an increasing number of refugees. The Harappan occupation deposit at some of these sites is only 3 to 4 ft. thick and the mounds are a few hundred feet square. In course of time the people moved into the interior of the peninsula and settled down in the upper reaches of the Sabarmati, Bhogava, Bhadar, Shetrunji and Hiran rivers. Thus came into existence larger village settlements of the Late Harappans at Gop, Rojdi, Adkot, Devaliyo, Bhimpatal, Akrau, Rangpur etc.,[2] where a low grade Harappa Civilization which underwent further changes and later evolved itself into a new culture, has come to light. The first evolutionary stage of the civilization is now confirmed by the excavations at Lothal also. Prabhas (Somnath), Amra, Lakhabawal, Machiala Mota, Adkot and Kana Sutaria are among other sites where the Lustrous Red Ware Culture was evolved from the decadent Harappa Civilization.

As a sequel to the great flood at the end of phase IV the destruction of the township and dock at Lothal was complete. Those few inhabitants who dared to return to their home after the recession of the flood had hardly any resources to rebuild the town. They found that their houses were reduced to a heap of earth, and did not also care to remove the debris while building anew some shelters for themselves. Their jerry-built houses of mud and reeds are ill-paved, ill-ventilated and bereft of sanitary facilities. The bath-rooms and runnels, wherever they exist, are of brick-bats, and the foundations are not carried deep, while the superstructure is shabby.

Phase V of Lothal i.e., Period B can be roughly equated to Rangpur IIB and IIC except for the fact that the evolved ceramic types of Lothal B do not bear a lustrous red surface as in Rangpur IIC. Whereas Lothal was finally destroyed before the Lustrous Red Ware Culture could attain maturity, Rangpur continued to be occupied for a couple of centuries more when the distinctive features of the Lustrous Red Ware Culture in painting and surface treatment of the evolved ceramic types came to be established. This explains the occurrence in Lothal B of evolved ceramic forms such as the concavo-convex-sided bowls without the red lustre noticeable on the Rangpur vessels. Other evolved types of

[1] *Indian Archaeology,* 1958-59 *A Review* (New Delhi 1959 ed. A. Ghosh), p. 50.

[2] S. R. Rao, *Ancient India,* nos. 18-19, pp. 184-188

Rangpur IIC noticeable in Lothal B are the non-carinated flattish dish with a beaded rim in sturdy red ware, the long-necked jar in coarse red ware and the storage jar with a clubbed rim. The stages of evolution of the main ceramic forms may be noted here. The convex-sided bowl (fig. 69, *187*), which is a unique local type borrowed by the Harappans on their arrival at Lothal evolved itself first into a straight-sided bowl (fig. 83, *256*), then into a blunt-carinated bowl (fig. 83, *257a*), and finally into a sharp-carinated bowl with a concavo-convex profile (fig. 83, *257c*) closely following the stages of the Rangpur bowl.[1] The convex-sided bowl with a short stud-handle in the Micaceous Red Ware developed a longer handle (fig. 86, *280*) and became larger in size. The jar with a small neck, bulbous body and disk base (fig. 44, *14*) developed a long neck (fig. 80, *234* & *234a*), ovoid body and rounded base (fig. 86, *277c*). The dish-on-stand became thicker with a wider squattish stand (fig. 81, *242* and *243a*), while the dish gradually lost its carination (fig. 81, *247* and *247a*; fig. 82, *248a*, *248g* and *248h*) and became flatter. The large storage jar with a flat projecting rim and straight or convex profile (fig. 38, *1a* and *3*; fig. 54, *82* and *82b*) developed a clubbed or beaked rim (fig. 79, *228* and *229*). The goblet, beaker and cylindrical perforated jar became scarce and ultimately went out of use. In painting, the colour scheme continued to be black-on-red in phase V also, but owing to the disappearance of the Buff Ware, chocolate was rarely used for decoration. Very few vessels were treated elaborately with naturalistic and semi-naturalistic designs such as the palm, pipal leaf, peacock, scale-pattern and fish-net, but they are not totally absent. The bird, perhaps a peacock, and pipal leaf motifs are seen on a sherd from phase V (fig. 88, *B4*), whereas the palm occurs on a typical Harappan 'S'-shaped vessel, as also on another sherd (fig. 88, *B9* and *B16*). Another plant motif common to Periods A and B is the wheat chaff (fig. 75, *A45* to *A52* compare with fig. 88, *B11* to *B14*). The most interesting motif is the stylised peacock from phase V (fig. 88, *B1*) which closely resembles the one from Period IIB of Rangpur[1]. Further stylization of the bird holding fish is noticed on another sherd from phase V of Lothal (compare fig. 74, *A9* with fig. 88, *B5*). Derivative leaf patterns continued to be painted in phase V as in the earlier phases (cf. : fig. 41, *9*, fig. 42, *9a* with fig. 94, *B130* to *B133*), but in limited numbers. The over-all treatment of the vessel surface and combination of semi-naturalistic and geometric forms such as filled triangles are other decorative features characteristic of the Harappan style surviving in Period B (fig. 89, *B30, B33* and *B36*). But the bulk of the painted designs in this phase consists of simpler linear patterns such as horizontal bands, groups of horizontal and vertical wavy lines (fig. 91, *B64* to *B83*), oblique lines (fig. 90, *B51* to *B54*), loops and fronds (fig. 92, *B98* to *B104*; fig. 93, *B105* to *B110*) and hatched circles, lozenges, triangles, panels and volutes (fig. 92, *B90* to *B96*; fig. 93, *B111* to *B123*). Some of the linear patterns and plant motifs occurring individually in Period B were already known in Period A but remained inconspicuous as they were skilfully woven into the naturalistic and geometric patterns (fig. 42, *9a*). The oblique and wavy lines and hatched panels occasionally occur singly (fig. 77, *A69* to *A79*) in Period A. Similarly the wheat-chaff and other vegetable motifs are not infrequent (fig. 75, *A47* to *A52*). A striking feature of Period B is the emphasis laid on linear patterns especially groups

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[1] *Ancient India,* 18-19, fig. 15.

of oblique and wavy lines, loops and fronds, hatched panels and volutes to the partial exclusion of other naturalistic patterns. This may be attributed to the decline in the prosperity of the town and consequent lack of demand for elaborately painted vessels. The stylization of the peacock and other birds and simplification of plant motifs are suggestive of the hurry with which the potter painted the vessels. A point of interest is that the evolved bowl-types are not painted with caprids in outline whereas in Rangpur IIC they occur frequently on carinated bowls.

Another change noticeable in Lothal B is the gradual replacement of cubical weights of chert and agate by truncated spheriod weights of schist and sandstone larger in size than the earlier ones. Owing to the set-back in foreign trade, import of copper was greatly restricted. Chert and steatite could not be procured. This necessitated a switch-over to locally available raw materials such as jasper and agate. As a result, only short parallel-sided blades could be produced, but however, the technique followed was the 'crested-ridge-guiding technique'. These short blades (fig. 124) replaced the long ribbon flakes of chert (figs. 122-123), so did the biconical terracotta beads (fig. 127) replace those of jasper and carnelian. Steatite was hardly used except for making seals in Period B.

A significant change in the Harappan tradition is noticed in the script and the type of seals used. The very fact that a few rectangular seals of steatite with or without a perforated boss but bearing Indus signs occur in Period B is indicative of the continuity of Harappan traditions. The importance lies in the absence of animal motifs, as also of pictures, in the script engraved on the Late Harappan seals (pl. CLV B). It is likely that the pictures of bird etc. were intentionally dropped during this period with a view to simplify the Indus script, which is now found to consist of not more than 20 basic linear signs as against 52 in the mature Harappan writing.

The evolution of new forms was not confined to earthenwares and lithic tools. Even the terracotta figures of cattle are now slightly different suggesting a breed different from the Brāhmani type. The terracotta lamp of Period A (fig. 69, *189a*) was also modified in Period B by developing an incurved rim and well-formed projecting lip (fig. 83, *260*).

A new ceramic ware designated Prabhas Ware by P. P. Pandya occurs at Lothal in very small quantities along with the degenerate Harappan wares in the early levels of phase V. The only type noticed in this fabric is a greyish brown bowl painted in pink with groups of vertical wavy lines exactly as in Somanath (Prabhas) Ib. In Rojdi Ia also this ware occurs along with the straight-sided bowls in a degenerate Harappan fabric.

The Late (degenerate) Harappa Culture noted for its evolved ceramic types died a natural death by 1600 B.C. at Lothal, but it survived a little longer at Rangpur in IIC and III to evolve a new technique of decorating the modified Harappan ceramic types termed Lustrous Red Ware.

CHAPTER IV

CHRONOLOGY

1. CONVENTIONAL DATE OF HARAPPA CIVILIZATION

In the early thirties of this century and later the chronology of the Harappa Culture was based primarily on comparative archaeology. Twelve Indus seals were found in the Sargonid levels of Ur, Kish and Tell Asmar, and two from Ur have been assigned to the pre-Akkadian levels. One of them bears an archaic cuneiform inscription and the other closely resembles a seal found at Mohenjo-daro at a depth 14.82 feet. Two Indus type seals from Ur are known to have come from the post-Akkadian levels, and one from Lagash is also assigned to the same period. Thus it is fairly clear that Indus seals reached Mesopotamian sites during, before and after the Akkadian period. In addition to seals a few other knick-knacks were exchanged between the Harappan and Mesopotamian sites. The more important among them are etched carnelian beads, kidney-shaped bone-inlays, ivory rods, and knobbed pottery, originating in the Indus valley and Gujarat, which reached the Euphratis-Tigris valley in the course of trade. From the other end the Harappan cities received hut-type urns of chlorite schist and bun-ingots of copper and bronze. The etched carnelian beads which were manufactured at Lothal and Chanhudaro are reported from the Early Dynastic III and Sargonid levels of Ur, Asmar etc., while the kidney-shaped inlays are also found in the Sargonid levels of Asmar (fig. 6; pl. CCII). The hut-shaped stone unguent vessels divided into compartments and occasionally carved with interwoven matting design are common in Khafaje, Ur, Kish, Susa II and now in Yahya Tepe (Iran). They occur in the early levels of Mohenjo-daro also. On the basis of these and other evidences the Harappa Culture was dated 2500-1500. B.C., but recently this date has been questioned.

2. LOTHAL

A. Carbon-14 Dates of Lothal

Since last twenty years Carbon-14 dates are available for a number of sites including Mohenjo-daro, Lothal, Kalibangan, Rojdi, Kot-diji, Amri and Damb Sadaat. Relying entirely on C-14 dates Agrawal[1] has suggested a maximum spread of 2200-1700 B.C. for the peripheral Harappa Culture (Lothal and Kalibangan), and 2300-2000 B.C. for the metropolitan centres (Harappa and Mohenjo-daro) ignoring thereby the overwhelming archaeological evidence which take the beginning of Harappa Culture back to 2500 B.C. Allchin[2] too relies entirely on C-14 dates for the chronology of Harappa Culture. We may examine the implication of C-14 dates for Lothal.

[1] D. P. Agrawal 'Harappa Culture ; New Evidence for a Shorter Chronology'; *Science* (Washington, Feb. 28, 1964), pp. 450-52.

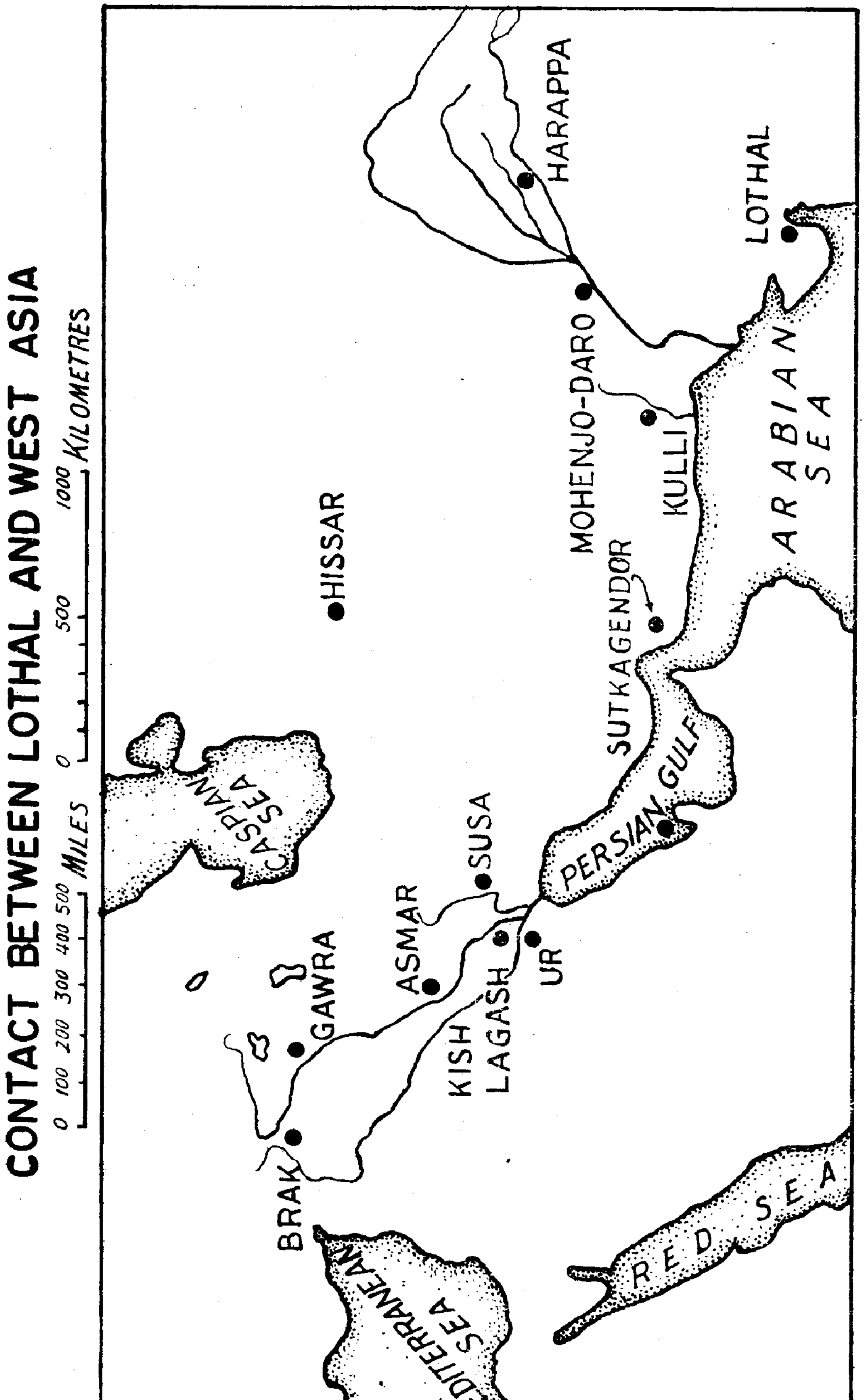

CONTACT BETWEEN LOTHAL AND WEST ASIA
0 100 200 300 400 500 MILES
0 500 1000 KILOMETRES
HARAPPA
LOTHAL
MOHENJO-DARO
KULLI
HISSAR
SUTKAGENDOR
ARABIAN SEA
PERSIAN GULF
CASPIAN SEA
SUSA
ASMAR
GAWRA
KISH
LAGASH
UR
BRAK
MEDITERRANEAN SEA
RED SEA

FIG. 6

Sample No.	Cultural period	Phase	B.C. dates based on half life 5730	
TF 22	A	IIIB	2010±115	First series
TF 27	A	IIIB	2005±115	
TF 26	A	IIIB	1995±115	
TF 29	A	IV A	1895±115	
TF 23	B	V A	1865±110	
TF 19	B	V A	1800±140	
TF 136	A	I	2080±135	Second series
TF 135	A	IIA	1555±135	
TF 133	A	IIB	1895±115	

The charcoal sample (TF 22) from the loose ashy layer 9 of SRG 2, E13 sealing the remnants of the mud-brick wall of phase IIIB (fig. 7) is dated 2010±115 B.C. This layer comprising of silt and flood-borne debris marks the end of the heyday of Lothal A. Another specimen (TF 27) from layer 7A of D 13 of the trench is dated 2005±115 B.C. This stratum of flood deposit seals another mud-brick house of phase IIIB, which was destroyed by a great flood. It is interesting to note that a second sample from layer 7A of the same grid has also been dated 1995±115 B.C. (TF 26). All the three samples occurring in the latest levels of phase IIIB thus give a consistent date ranging from 2010 to 1995 B.C.

A charcoal sample (TF-29) from layer 7 of the cess pool in SRG 55 dug at the southern end and assigned to phase IVA is dated 1895±115 B.C. The pottery and charcoal from this layer were both waterlogged. The next phase, namely IVB, which marks the end of Lothal A may, therefore, be assigned to 1900 B.C. A charcoal sample (TF 23) from layer 4 of SRG 54 collected from a posthole in a mud wall of phase VA is dated 1865±110 B.C. It marks the end of Period A and the beginning of Period B and thereby confirms the absence of any hiatus between periods A & B. Another sample (TF-19), which comes from layer 5B of SRG 11 is dated 1800±140 B.C. The debris layer from which this sample was collected seals the western wall of the dock damaged in phase IVB and is itself assigned to phase VA. Thus the Carbon-14 date of sample TF-23 and TF-19 confirms the ceramic and stratigraphic evidence of continuous evolution of the Harappa Culture without any break between phase IVB and VA. An important conclusion that may be drawn from the Carbon-14 dates of Lothal and Kalibangan is that the closing date of the mature Harappa Culture in the Indus valley should be brought down from 1500 B.C. to 1900 B.C.

None of the samples of the second series conforms to the dates of the first series. Phase IIIB is firmly dated 1995 to 2010 B.C. by 3 samples of the first series, whereas the earlier phase IIB is dated 1895±115 B.C. by the second series. More strange is the fact that IIA is dated 1555±135 B.C. Hence one is fully justified in rejecting the second series dates perhaps because the samples are contaminated. The close dating of phases IVA (1895±115) and VA (1865±110 and 1800±140) by first series samples further helps to decide when Period A (mature phase) of the Harappa Culture at Lothal came to an end. It can be safely dated to 1900 B.C. Then we have two firm dates i.e. 2000 B.C. for IIIB and

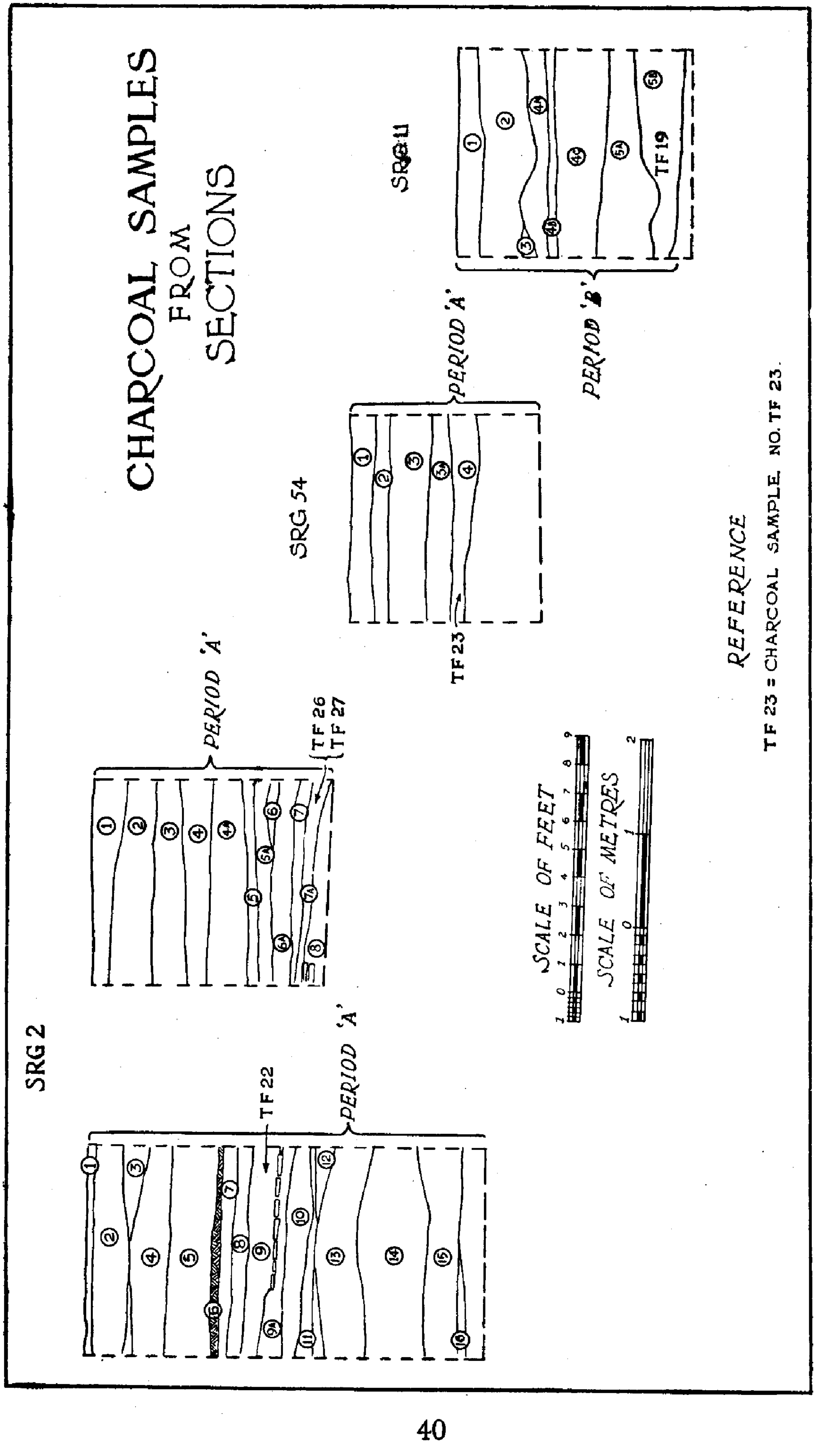

CHARCOAL SAMPLES
FROM
SECTIONS
SRG 2
PERIOD 'A'
TF 22
PERIOD 'A'
TF 26
TF 27
SRG 54
PERIOD 'A'
TF 23
SRG 11
PERIOD 'B'
TF 19
SCALE OF FEET
SCALE OF METRES
REFERENCE
TF 23 = CHARCOAL SAMPLE NO. TF 23.

FIG. 7

1900 B.C. for the end of IVA. In order to date the earlier phases namely IIIA, IIC, IIB, IIA and I one has to rely on archaeological evidence which can be cross-checked.

B. Date Based on Seals

Gadd has ascribed two Indo-Sumerian seals from Ur to the pre-Akkadian period. One of them, having a vague resemblance to Indian seals, bears an archaic cuneiform inscription and the other has analogy with the Mohenjo-daro seal found at a depth of 14.8 ft. The seals of the pre-Akkadian period do not push the date of the Harappa Civilization very much backward. So far as the later levels are concerned three Indus seals, two from Ur and one from Lagash, occur in the post-Akkadian context. A crude cylinder seal found from the Larsa Tomb at Ur is assignable to the beginning of the second millennium B.C. while another seal from the upper rubbish Kassite (?) levels is datable to 15th-16th century B.C. The latter bears a human figure carrying a fish-net similar to the one painted on a potsherd from Harappa. On the whole the Indus type seals from Ur suggest that the Indus cities had maximum contact with Sumer and Akkad with a focus on the Sargonid period which, according to the latest view, is dated 2370-2284 B.C. According to Wheeler there were two waves of trade, the first in the Sargonid period, and the second beginning with King Ur-Nammu (2100 B.C.) and ending with the close of the Larsa period (1900 B.C.).

A significant datable find from Lothal is a circular steatite seal of grey colour bearing on the obverse two jumping gazelles flanking a double-headed dragon. There is no legend on it. The large button-like boss incised with two lines in one direction and perforated in the other has four double-circles. It resembles in many respects the circular stamp-seals found at Ur (referred to by Gadd) and those recently found in large numbers in the Barbar Temples of the third millennium B.C. by P.V. Glob and Geoffrey Bibby in the Bahrain islands.[1] The excavators have recognized two types; the earlier type is assigned to the pre-Sargonid period and the late type to the Sargonid and post-Sargonid periods. The Bahrain seal, also called the 'Persian Gulf seal', could not have reached Lothal earlier than phase IIa and may be supposed to have reached, at the latest, in phase III when Lothal had maximum trade contact with the West, but it cannot be assigned to phase IV or V when trade had declined. Wheeler assigns the 'Persian Gulf seals' to 2000 B.C. Briggs Buchanan who has classified the Persian Gulf seals into Types I, II, and III includes the Lothal seal in Type III and assigns it to the late decadent phase (1900 B.C.).[2] But the circular steatite seal must have reached Lothal before the flood in phase III for reasons stated above and is, therefore, earlier than 2000 B.C.

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[1] T. G. Bibby 'The Ancient Indian Style Seals from Bahrain' *Antiquity,* XXXII, 128 (Cambridge, 1958), pp. 243-46.

[2] B. Buchanan 'A Dated Seal connecting Babylonia with Ancient India' *Archaeology* 20, no. 2, (1967) p. 104; also Buchanan. 'A Dated Persian Gulf Seal and its Implications' *Studies in Honour of Benno Landsbeger* (Chicago 1965).

C. Copper Objects

A copper amulet in the form of a couchant bull perforated horizontally (pl. CCXLIIIA) was found in layer 9 of SRG 1 and assigned to phase IIB. The bull looks sideways and its legs are folded as in the case of the amulet figures from Susa D and Ur. Analogous amulets are found in lapis lazuli, copper and other materials from the It Dynasty levels of the Al' Ubaid period in the Royal Cemetery at Ur[1]. One of them (120976) in the British Museum is of particular interest as it has a close resemblance to the Lothal specimen.

A bird in copper with traces of a rod at the bottom (pl. CCXLV A) found in a mud-brick house in layer 9 of the grid C 29 in SRG 2 is assignable to phase IIIB, and must have been used as a hairpin. It recalls a similar bird-on-rod figure in copper found in one of the temples near Barbar village. Copper hair-pins with bird-head are also found in Alisar II[2].

D. Beads

Wafer or disk-beads of steatite and carnelian occurring in the Uruk-Early Dynastic levels of the third millennium B.C. at Brak continue in Sargonid levels along with tubular dentilium beads and segmented beads of agate. Lothal was an important centre where steatite disk-beads were made and dentelium was collected. It may not be too much to assume that the beads travelled as far as Brak from Lothal.

Circular disk-beads of gold with axial tube produced by beating two leaves together have been found in a merchant's house of phase III in SRG 2. It is interesting to note that similar ones occur in the Intermediate Levels of Mohenjodaro, in Troy IIG[3], Hissar IIIB, Ur-Early Dynastic III[4] and cemetery A of Kish. The beads are circular and oval in shape at Tepe Hissar, lozenge and circular at Ur, and lozenge at Kish. Circular silver beads with axial tube are found in 2400 B.C. levels of Brak. Gold beads of similar shape occur in 2300 B.C. levels of Troy IIG and 2400-2300 B.C. levels of Poliochur. Hence the disk-beads of gold from Lothal phase III may be assigned to 2200 B.C.

E. Terracotta Objects

Terracotta gaming pieces of the shape of castle, pyramid, cone and tetrahedron and gamesmen with animal heads throw more light on the contacts Lothal had with Egypt and Sumer. Zoomorphic gaming pieces representing dog and bull found in phases II-IV

[1] Sir Leonard Wooley : *Ur Excavations*, II (Philadelphia, 1939), pl. 142.

[2] S. Piggot, 'Notes on certain Pins and Macehead in the Harappa Culture' *Ancient India*, no. 4 (New Delhi) pp. 33-38.

[3] C. W. Blezen and Owen : *Troy* (Princeton, 1950) p. 367 ; fig. 357, no. 37-712.

[4] Wooley *op. cit.* (1939) pl. 95.

at Lothal are similar to those from the tomb of Queen Hatchepsout in Egypt and Stratum VIII of Tepe Gawra, while tetrahedrons and pellets with four blind holes bearing resemblance to those from the Early Dynastic levels of Royal Cemetery at Ur are found in phase III and later. Cones and pellets occurring at Lothal are comparable to those of Tepe Gawra stratum VIII. Terracotta pyramidal gaming pieces with ivory handle of the type occurring at Lothal are known from the Royal Cemetery.

Crudely modelled terracotta human figures including one with a pedestal base and animal figures from phase III of Lothal are reminiscent of similar crude figurines from the Sargonid levels of Brak.

Biconical bead-like terracotta objects from III Dynasasty levels of the Royal Cemetery at Ur (2120-2106 B.C.) which are considered to be net-sinkers and terracotta cones from Ubaid are comparable with similar objects from Lothal phases II and III.

F. Pottery

The report of the Archaeological Chemist shows that a fine sturdy ware of reddish texture was treated with two slips, first with a red, and then with a white, slip and the upper one was partly removed to expose the lower one. The wavy lines are produced by scraping with a comb-like instrument. Pottery treated in this technique is known as the Reserved Slip Ware. It occurs in the Al'Ubaid and Jamdet Nasr periods of Ur and central Mesopotamian sites, and survived in the Sargonid period at Brak[1] and in Cemetery A at Kish.[2] Perhaps the later sherds are only imitations. At Lothal we find sherds of red, cream, grey and buffish fabric treated in this technique. They come mostly from phases II and III, but there are a few coarse ones from phase IV also. Besides the trickling of Reserved Slip Ware from Brak, a jar sealed with a stamp seal bearing a swastika motif drawn in multiple lines, which recalls the stamp seal from Sargonid levels of Brak, occurs at Lothal in phase III. Apparently Lothal had contacts in phases II and III with Brak and Kish in the Akkadian and post-Akkadian periods. In this connection the occurrence of Indus weight and etched carnelian beads in Sargonid levels of Kish, Brak and in Susa D[3] should substantiate a Sargonid date for the beginning of phase II of Lothal based on the presence of the Reserved Slip Ware.

G. Tepe Yahya Evidence

Lamberg Karlovsky has reported a potsherd stamped with Indus seal from his excavation at Tepe Yahya in 1971. The charcoal sample from the layer which has yielded the said potsherd has been dated 2320 B.C. by the Tata Institute of Fundamental

[1] M. E. L. (Sir Max) Mallowan, *Iraq*, IX (London 1947), pl. XLIII, 1-5.

[2] E. J. H. Mackay, *Report on the Excavation of the 'A' Cementery at Kish*, (Chicago, 1925) pl. XI.

[3] Noticed in the reserve collection of the Louvre Museum, Paris.

Research. If an earthen ware stamped with Indus seal were to reach Yahya in 2320 B.C. it goes without saying that the Harappan sites must have been in existence at least a century earlier to develop into large cities and establish trade contacts with Iran.

Taking all the archaeological evidences and the C-14 date of Tepe Yahya into account it can be safely concluded that by 2400 B.C. the Harappa Civilization was very prosperous. On this score the beginning of the Harappa Civilization should be dated 2500 B.C. Lothal was occupied by the Harappans not long after this date because it is found to have come in contact with Ur and Brak in phases II and III which can be equated to the Sargonid period on the evidence of knick-kancks of Sumerian origin found at Lothal. It is in phase II that the town was elaborately planned, the dock was built, trade expanded and new industries were established. Further expansion of the town and its industries took place in phase III. Taking 2000 B.C. (TF 26, TF 27) as the central date for Period A of Lothal, the beginning of phase IIA may be dated to 2200 B.C. and the beginning of phase II to 2350 B.C. It may be noted that there are 3 building sub-phases in II and 2 sub-phases in III and that phase II had already received knick-knacks ascribable to the Sargonid period. Granting that the life of the village was only 100 years, the beginning of Lothal phase I goes back to 2450 B.C. An important consideration in assigning this date to the beginning of occupation of Lothal is the presence of a 10 ft. thick habitation deposit with a structure *in situ* below the present water table. Partial investigation of the strata in SRG 30 revealed that the Harappans had occupied the lower part of the mound long before the construction of the earliest structure in the Acropolis and lived peacefully with the local inhabitants. The progressive increase in the quantum of the Micaceous Red Ware and the corresponding decrease in the Harappan wares in the stratified layers below the water table suggest that there was a variant culture preceding the advent of the Harappans. For reasons stated earlier, it must have taken at least a century for the Micaceous Red Ware-using people at Lothal to develop a ceramic tradition of their own which was too strong to be ignored by the Harappans when they arrived on the scene in phase I. In assigning dates to Period B (phase V) it is essential to remember that heavy erosion of the mound has removed vast quantities of occupation debris. The poor quality of mud-brick buildings greatly contributed to the denudation of the mound. Hence the thickness of occupation deposit in this phase is not much. It is, however, the time taken for discarding certain ceramic types and evolving gradually new metal and lithic tool types, new ceramic wares and a simplified writing (alphabetic system) that should be the criterion for dating. These changes must have taken place over a period of two centuries. This can be cross-checked on the basis of archaeological finds occurring in datable levels at Ahar. Evolved Harappan ceramic types such as the high-necked jar with an ovoid body and bowl with blunt-carinated shoulder characteristic of Lothal phase V are encountered in Ahar IB. The C-14 date of Ahar IA (middle level) is 1727 ± 140 B.C. (TF-34). Ahar Ic (also middle level) is dated 1552 ± 108 B.C (TF-32). Assuming on this basis that the central date of Ahar IB is 1600 B.C. it is possible to date the end of phase VB of Lothal to 1600 B.C. especially because phase VA is dated 1800 B.C. by C-14 method.

3. ROJDI

Shri M. A. Dhaky has pointed out that the Carbon-14 date, namely 1945 B.C. (3920±115 B.C.), for the middle level of Rojdi IB should help to equate Rojdi I with the late levels of Rangpur IIA or Lothal phase IIIB, but it must be remembered that the occurrence in Rojdi I A of evolved Harappan types such as straight-sided bowl and the dish with a flaring or beaded rim which do not find a place in the mature Harappan phase at Lothal or Rangpur still remains to be explained. The survival of micro beads of gold and steatite at Rojdi does not necessarily make the site as early as Lothal phase IIIb.

In determining the evolution of the Harappa Culture in Gujarat the presence of the Late Harappan pottery types in Rojdi IA-IB, Rangpur IIB-IIC and Lothal B is more important than the survival of a few mature Harappan types in the late levels. In the absence of any evidence of planning of the town or any characteristically mature Harappan structural evidence it is desirable to bracket Rojdi with Late Harappan Period although the C-14 date of Rojdi IB (3920±115) suggests that Rojdi was occupied after the third flood (2000 B.C.) at Lothal.

4. REVISED DATE OF RANGPUR

In view of the revised chronology of Lothal it is necessary to revise the date assigned earlier to the end of the mature Harappa Civilization at Rangpur. The beginning of Rangpur IIA was fixed at 2000 B.C. This is confirmed by the Carbon-14 dates for phase IIIB of Lothal. The flood at the end of this phase which devastated Lothal must have driven a section of the Harappans from Lothal to Rangpur. The mature phase of the Harappa Culture i.e., Rangpur IIA might have come to an end in 1900 B.C. simultaneously with Lothal A. Although four structural phases are noticed here, the degeneration of the Harappan wares in Rangpur IIB and the evolution of new ceramic traditions in Rangpur IIC form a continuous process as in Lothal B. However this process stopped earlier at Lothal without evolving the new technique of producing a lustrous red surface on the newly evolved pottery shapes. Thus we find carinated bowls, flat dishes and high-necked jars in dull-red fabric without a lustrous red slip in Lothal B, whereas in the late levels of Rangpur IIC, these evolved ceramic types have a lustrous red surface. In view of the fact that Lothal B is dated 1900—1600 B.C., Rangpur IIB-IIC will have to be placed between 1900 and 1500 B.C. since the introduction of the new technique of surface treatment (in Rangpur IIC) must have taken about a century more. Rangpur IIC is therefore dated 1700-1500 B.C. and Rangpur IIB from 1900 to 1700 B.C.

By 1500 B.C. Ahar IC had already come in contact with Rangpur IIC as can be inferred from the occurrence of Lustrous Red Ware sherds, high-necked jars and dishes with beaded rim at the former site. Thus the date assigned to Rangpur IIC can be checked with the Carbon-14 dates of Ahar which are discussed below. Allowing two centuries for the maturity of the Lustrous Red Ware Culture, Rangpur III is dated 1500-1300 B.C.

5. AHAR

The radio-carbon dates for Lothal and Ahar have established the chronological probability of the contact of the black-and-red ware cultures of Lothal and Ahar. It may however be added that the Lothal folk were using the black-and-red ware as early as phase I (2450-2350 B.C.) when Ahar was not even inhabited. The middle level of sub-period IA of Ahar is dated 1725±140 B.C. and the earliest occupation is said to go back to 1800 B.C. by which time the mature Harappa Culture had already evolved new ceramic traditions. The presence of jars, dishes and bowls characteristic of Lothal B at Ahar in sub-periods IA and IB suggests that the two sites came in contact with each other in 1700 B.C. but not earlier. Even assuming that the first settlement at Lothal took place in 2200 B.C. as suggested by Agrawal, it must be remembered that the black-and red ware was in use four centuries before Ahar came into existence. Hence the question of Lothal borrowing the black-and-red ware from Ahar does not arise. Although the technique of inverted firing followed at Ahar and Lothal was the same, the shape of the vessels and the mode of decoration adopted at the two centres are different. Whereas the Lothal folk produced convex-sided bowls with or without a stud-handle in the black-and red ware and painted them on the interior only, the Ahar folk produced bowls with ribbings in phase IA-B and carination in phase IC. They painted them in the exterior or on both surfaces.

CHAPTER V

THE CUTTINGS

1. SRG 1

The general configuration and extent of the mound and its environs are described in Chapter II (above p. 20). The purpose and lay-out of the cuttings (pl. VIII) made from time to time may be noted here. The cutting SRG 1 was the first to be made in 1955 in the highest part of the southern half of the mound with a view to obtain maximum cultural deposit. It measures 210 ft. in length from east to west, and is 18 ft. wide. The flanking peg system was followed here, since the main purpose was to determine the sequence of cultures by vertical digging. The entire deposit of 18 ft. belongs to Period A, which is divided into four phases. There is no trace of occupation in Period B. Structural remains include traces of a mud-brick house of phase I, a mud-brick floor (25) of phase IIa reconstructed in phase IIb and a vaulted chamber (110) of phase IIIa. The importance of SRG 1 lies in the fact that the occupation debris of phase I extended throughout the trench and the Micaceous Red Ware was conspicuous in the lower levels. A partial view of the cutting can be had in plate XVIB.

2. SRG 2

This cutting, which is incidentally the largest, is laid out in a grid system with a view to extend the operations in any direction. Each grid is 18 ft. square. The trench extends northwards from the flight of steps cut in SRG 1 (pls. V & VI). The three rows of squares seen in Plate X are named A, B and C in a series from right to left i.e. westwards from the centre and square each is further distinguished by Arabic numerals 1, 2 etc. The cemetery was traced while extending the cutting westward at its northern extremity. The arterial streets 1 and 9 running respectively north-south and east-west in the Lower Town, the bead-factory in Block F and the northern arm of the Acropolis lie within SRG 2 (pl. IV). Block G and portions of Blocks B and E are also included in SRG 2 (pl. I). The main section looking east (pl. X) runs along Street 1 in Block A and partly across the mud-brick platform of Block B, thus correlating stratigraphically all the structures between B 34 and B 1 in SRG 2 whereby the relative position of the Lower Town and the Acropolis is also made clear.

It is only in SRG 2 that all the phases and sub-phases of structural activity can be seen. From the point of view of stratigraphy and cultural sequence the grid C 25 is important since all the successive deposits of phases I to V representing Periods A and B are noticed here. Structural remains of Period B are traceable over a considerable area

at the northern extremity of SRG 2. Among important buildings laid bare in this cutting mention may be made of the following :

A. Phase I

Str. 1—A mud-bund on the eastern and southern margins of the mound in QX 7—LX 9.

Str. 2—A mud-brick wall in DX 8, EX 8, and FX 8.

B. Phase IIa

Str. 14—Platform of mud-bricks and mud covering almost the whole of Block B.

Str. 15—Public drain running east-west and taking a turn to the north. It is joined by another east-west drain. Both serve as outlets for sullage and storm water in the Acropolis.

Str. 16-18—Burnt-brick floors of baths in Cl—D1 built along the arms of the main drain.

Str. 19-21—Brick-paved baths on the northern margin of the main drain in AX 1—BX 1.

Str. 26—Room with a drain in AX 2—BX 2.

Str. 29—Public drain running along the row of baths in Street 2.

Str. 30-40—Row of baths and drains in Street 2.

Str. 41-42—Warehouse in Block C.

Str. 43—Well in the southeast corner of the peripheral mud-brick wall in Block C.

Str. 46—Mud-brick walls built at a low level at the foot of the buttress wall of the Acropolis.

Str. 47—Terraced platform of mud-bricks in Block D.

Str. 48—Peripheral mud-brick platform built over the mud-bund on the southern and eastern margins of the mound and in the southwest and northwest corners.

Str. 49—Dock (eastern and southern embankments with inlet and spill-way).

Str. 52—Main drain running north-south and built over the clay-filling.

Str. 53—Mud-brick house partly built in N 3—O 3 in SRG 3 and partly in SRG 6.

C. Phase IIb

Str. 57-60—Three small baths and walls in AX 1, BX 1—BX 2.

Str. 61-69—Drains etc. built north of the main drain 15c.

Str. 72—Wall with bricks-on-edge running parallel to drain 15c on the northern margin of Lane 3 in CX 2—BX 2.

Str. 73-75—Reconstructed bath of phase IIa (26), burnt-brick wall parallel to Lane 3 on its southern margin and a mud-brick wall.

Str. 76-78—Reconstructed baths at the eastern extremity of Street 2 opposite the warehouse.

Str. 80—Brick-paved floor and bath built over the peripheral wall on the southern margin of the town.

D. Phase IIc

Str. 83-84—Brick-paved floor and a mud-brick wall in A 1—B 1.

E. Phase IIIa

Str. 108—Mud-brick house with dye-vats connected with drain 15c in CX 1—CX 2 and DX 1—DX2.

Str. 109—Fire-altar of mud-bricks with ash etc. in a house standing to the north of the dyer's house.

Str. 111-112—Two burnt-brick walls of two houses, one built on the southern margin of Lane 3 and the other on the northern margin marking the boundaries of the houses in BX 1.

Str. 113-115 and 117—Manhole, two brick-paved rooms with burnt-brick walls in BX 2.

Str. 116—Mud-brick house with a room, a verandah and a fire place in BX 4.

Str. 119-121—Mud-brick house with a burnt-brick floor of a room and a soakage jar lined with bricks in A 1—C 1.

Str. 125-129—Burnt brick drains and walls along the northern margin of the warehouse.

E. Phase IVa

Str. 144-148—Stumps of walls in B 31—B 34 on the eastern margin of Street 1.

Str. 150—Drain of burnt-bricks and a jar in B 25.

Str. 151—Mud-brick house with three rooms, a drain and an enclosure for fire-worship in B 24—C 24 in Street 1.

Str. 152-153—House with a bath; a drain in C 24—C 25.

Str. 154—Coppersmith's workshop with a furnace and an anvil in B 20—B 22 and C 20—C 22.

Str. 155—Mud-brick house standing on a low platform of mud-bricks and mud in B 18—B 20 and C 18—C 20.

Note: Structures 143-155 are built on the eastern margin of Street 1.

Str. 157—Mud-brick house with four rooms and a verandah in D 18—D 19. A dump of mollusca, chank-shells and beads in a bead-shop.

Str. 158—Shell-worker's shop with two rooms in D 19—D 20; dumps of columella, shell-bangles and rejected pieces of shell.

Str. 159—Mud-brick house with a verandah and three rooms built at the junction of Streets 1 and 9 in D 24—D 26, E 25—E 26 and F 25—F 27.

Note: Structures 157 to 159 are built on the western margin of Street 1.

Str. 160—Large mud-brick house with seven rooms built on the northern margin of Street 9 in Block G and extending over G 26—G 27, H 26—H 27, I 25—I 27 and J 28.

Str. 161—Fire-altar of burnt-bricks for community worship built at the junction of Streets 1 and 9 in D 29.

Str. 162-163—Mud-brick walls of a house with a floor of burnt-brick in D 29—D 30.

Str. 164—Bead-factory with an open courtyard and a central working platform surrounded by ten rooms for workmen to live in, built in J 10—K 11, L 8—L 11, M 8—M 11 and N 8—N 11 on the northern margin of Street 8 in Block F.

Str. 165-166—Mud-brick platform and a bead-kiln with four interconnected flues in the upper chamber in I 10—I 11 in Block F.

Str. 168—Large mud-brick house with a hall and four rooms built on the southern margin of Street 8 injK 3—K 5, L 3—L 5, M 2—M 5. Ovoid enclosure with a half-burnt mud-brick altar in the centre for ritualistic worship (?).

F. Phase IVb

Str. 170—Burnt-brick wall in A 2.

Str. 171-172—Two mud-brick houses with a passage in between, built on a mud-brick platform at the western end of Street 2. A brick-paved bath and drain in 172 and a dye vat in 171—all built in C3—C 4 and D 3—D 4.

Str. 174—Drain of burnt-bricks in B 33.

Str. 175-176—Mud-brick house with four rooms in B 17, C 18—C 19 in Street 1—an extension of a house of phase IVa.

Str. 177—Drain of burnt-bricks built over house Str. 157 in D 18—D 19 on the western margin of Street 1.

Str. 178—Mud-brick house with a room and two drains in D 20—D 21 standing on the western margin of Street 1.

G. Phase Va

Str. 180—Mud-brick house with a burnt-brick wall and a room in A 34.

Str. 181—Two burnt-brick walls in B 33.

Str. 182-187—Smithies with a cluster of five miniature bath-like sinks interconnected with drains and paved with burnt-bricks. A pot-furnace found near each structure built in A 27—A 29, B 27—B 28 at the northern end of Street 1 on the eastern margin.

Str. 188—Burnt-brick drain with traces of a floor in C 24.

Str. 189-190—Mud-brick house with a large hall, a bath and a jar with a semi-circular brick enclosure built in D 28, E 28 and F 28 on the northern margin of Street 9.

Str. 191—Mud-brick house with two rooms and a drain partially traced in G 26—H 26 on the southern margin of Street 9.

Str. 192-193—Two mud-brick houses with two verandahs and a room in H 28—L 28 in Street 9.

Note: Structures 189 are built in Block G.

H. Phase Vb

Str. 195—Mud-floor of a hut with reed-walls in H 27 in Block G.

Str. 196—Mud-brick house in L 28 encroaching upon Street 9 in Block G.

Str. 197—Bath and drain of burnt-bricks.

3. SRG 3

This cutting is gridded and extends from the southern margin of SRG 1 to the foot of the mound covering almost the whole of the Acropolis. The three figures seen in Plate VIIB indicate the three Blocks B, C and D. The figure in the centre indicates the site of the ruler's mansion (Block B), while the figures on the right and left indicate the warehouse (Block C) and a mud-brick platform (Block D) respectively. The grid system was extended to the southern slope of the mound in order to expose the platform of the warehouse and the peripheral wall which is indicated by the standing figure in Plate VII A. Remnants of the buildings raised over the massive platforms for the ruler of the town and the elaborate sanitary arrangements made in the form of baths, drains, manholes, cess-pools etc., can be seen in Block B. The superstructure of the grand mansion where the ruler and his entourage lived is found destroyed by floods. What remain at present are some stumps of walls, drains of burnt-bricks, leaving residual plan of the Acropolis with its streets and houses. The existence of three streets numbered here 2, 3 and 4 running parallel to one another in an east-west direction is suggested by the extant public and private drains and stumps of walls of houses flanking them in Block B (below p. 102 ff).

The warehouse in Block C is also bereft of the superstructure which appears to have been built of some perishable material like wood. It is likely that originally a larger number of cubical blocks stood on the podium.

There is absolutely no trace of any building raised over the platform in Block D 1. A public drain connecting the two arms of another public drain in Street 2 runs over the sloping mound between Blocks C and D, and finally discharges itself in a cess-pool built on the outer face of the peripheral wall. The great care taken in protecting Block C from floods by building platforms of mud and mud-brick on all sides signifies its importance. The eastern arm of the peripheral wall (pl. XXXVIII) forming the wharf is also included in SRG 3.

4. OTHER CUTTINGS

Some bricks found *in situ* at a depth of 4 to 5 ft. in SRG 4, a small cutting made near the camp about one furlong south of the moundy suggested that the habitation area covered a much larger area than what is indicated by the mound but extensive digging was not possible due to high water table.

The cutting SRG 5 measuring 15 ft. wide and 102 ft. long in the east-west direction was sunk on the northern slopes between Blocks F and G. The mud-brick platform exposed therein suggests that houses in the Lower Town also were raised on platforms.

The cutting SRG 6 (pl. IXA) made in the south-west corner of the town with a view to ascertain the extent of the peripheral bund is 201 ft. long and 15 ft. wide. Among the structural remains found therein the mud-brick platform built in phase IIa (48b) over the eroded face of the mud-bund is significant, since it proves that the bund and platform extended on the western fringe of the town. Others include mud-brick houses and platforms of phases III and IV. The cuttings SRG 7 and SRG 8 are just trial pits sunk to the west of the Gundi-Saragwala road near the camp wherein Harappan pottery including a lamp was found. The cutting SRG 8 reveals the extension of the cemetery to the south of SRG 2 outside the peripheral wall. The cuttings SRG 27 and SRG 28 were made with a view to ascertain the limits of the cemetery but they yielded only a few stray bones. All the trenches, namely, SRG 9 to SRG 13 were dug at intervals to expose the western embankment wall of the dock and the wharf. The inlet of the second stage and the eastern embankment were laid bare in SRG 14 and SRG 15. In SRG 56 traces of the northern embankment wall and the inlet of the first stage were found. The southern embankment and the spill-way were noticed in SRG 3 when extended eastwards for this purpose.

The cutting SRG 16 was laid at right-angle to SRG 2 with a view to trace the full extent of the burnt-brick drain noticed behind coppersmith's workshop in the Lower Town. Two burnt-brick drains (138 and 139) and a burnt-brick wall built in north-south direction were laid bare in this cutting. A large storage jar in Red Ware found embedded in the floor of a mud-brick house (156) is assigned to phase IVa, whereas the structures 138 and 139 are assigned to phase IIIB.

The trench SRG 17 was laid a few yards to the northwest of the dock in order to ascertain the stratigraphic relation between the dock and the habitation area. A brick-paved bath and a jar (173) belonging to phase IVA and a burnt-brick structure built adjoining a soakage jar ascribed to phase VA are the only remnants of the dock-worker's quarters. The stratigraphic evidence shows that the dock fell into disuse after the fourth flood in 1900 B.C.

At a distance of 150 ft. to the north of the northern embankment of the dock the cutting SRG 18 revealed a bowl-like depression indicating a silted-up water-channel, while SRG 19 confirmed the existence of a *nullah* flowing along the northern margin which enabled ships to enter the dock in phases II and III. Before this channel was discovered a mile-long inlet-channel connecting the river with the inlet gap in the eastern embankment was noticed in trenches SRG 34, SRG 38, SRG 39, SRG 46 and SRG 53. Other trial pits namely SRG 40, SRG 47, SRG 49, SRG 51 and SRG 54 were also dug with the same purpose. Some of them are marked on the site plan (pl. IV). The cuttings SRG 29, SRG 30, SRG 33 and SRG 44 were made between the dock and the depression to the west of the mound with a view to ascertain how the excess water of the dock escaped through the spillway. A bowl-like depression was noticed in SRG 42 and the original flow-channel of the river in SRG 43 sunk on the western margin of the town. For purposes of tracing the original intake channel on the northern margin of the town the cuttings SRG 58, SRG 18,

SRG 13, SRG 59 and SRG 28 were made. The *nullah* and the channel of the first stage were traced in SRG 58 and SRG 61. The sections of the inlet channels of the first and second stages and the nullah can be seen in plates CVB, CVIA and CIX. An important cutting made in the field south of the mound near the pottery yard is SRG 30 in which two burnt-brick walls with their foundations laid in silt-rock (pl. VIII) at a depth of 18 ft. below the present ground level, (which itself is 18 ft. below the summit of the mound) were noticed. A stump of the first wall was found *in situ* while the second wall which seems to run parallel to the former is destroyed very much. It is likely that the excess water from the dock escaped through this channel. Digging about 10ft. below the sub-soil water level posed a great problem in spite of the fact that pumps were continuously used for baling out water. Hence the attempt to trace the channel to its full length was given up. It must however be emphasized that a deeper digging of the original habitation area which extends far beyond the present mound into the fields may bring to light many old constructions including irrigation works and perhaps earlier phases of occupation in SRG 30. In this connection the occurrence of bricks etc. in the cuttings made behind the camp near the Lothal tank assumes importance. If and when excavation is resumed at Lothal the problem of under-water digging should be tackled boldly.

Mention may be made of the cutting SRG 54 (pl. IXB) which runs from west to east on the eastern slope over a length of 189 ft. Extending from SRG 2, it almost touches the easternmost point of the habitation area near the wharf. This cutting is important for two reasons, firstly because occupation debris of phases II to V is noticed here, and secondly because the Carbon-14 date for a charcoal sample collected from the posthole of a mud-house of phase Va in this trench confirms that there was no gap between phases IV and V.

A burnt-brick wall built in phase IIa over the eroded mud-bund of phase I on the northern fringe of the town against the overflowing nullah has been laid bare in SRG 39. The ships were originally sluiced through this nullah and also moored here as indicated by the anchor stone found *in situ*.

CHAPTER VI

STRATIGRAPHY

1. GENERAL

The summit of the mound is 56 ft. above the mean sea level while the base is 37.20 ft. (pl. IV). The rise is more conspicuous on the southern side due to the fact that the mud-brick platforms of the Acropolis and warehouse are still preserved upto a height of 12 to 15 ft. whereas the platforms of the Lower Town in the northern half are eroded heavily. The mud-brick houses built in both the sectors are however turned into a mass of debris which has accumulated mostly in the Lower Town. The simultaneous process of erosion of the higher regions and the silting up of the lower ones has dwarfed the mound which appears shrunk in area also. Two rain-gullies, one running eastward from the southeast corner, and the other southwestward from the central point were visible before the mound was excavated, but no clue was available as to the alignment of the main streets. Owing to the fact that almost the entire township was built with mud-bricks and most of the houses have melted away into debris, some difficulty was experienced, and much time had to be spent, in distinguishing deposits of disintegrated mud-bricks from the mud-brick platforms and walls. Secondly, the enormous size of mud-brick structures such as the platforms of the Acropolis, the warehouse etc. prolonged the process of ascertaining the full plan of various buildings and streets.

In order to follow the stratigraphy of the site it is necessary to understand the lay-out of the main town and its buildings. Originally Lothal was a small village with a few mud-brick houses raised on a natural tell, the western fringes of which were washed by a river and the northern margin by a nullah. A mud wall (*bund*) was raised on all sides to protect the village from inundation, but a flood at the end of phase I destroyed the town and caused breaches in the bund. The inhabitants completely remodelled and expanded the village into a town by building houses on mud and mud-brick platforms of varying heights to protect them against flood. The warehouse and ruler's mansion were built on a 15 ft. high platform in the Acropolis which occupied the southern sector of the town. The *bund* was reinforced with burnt bricks on the northern margin and with mud-bricks elsewhere, while the dock was built along the eastern margin. Once again a flood destroyed the houses, but they were quickly rebuilt in phase III after raising the height of the platform in some cases. More factories and dwellings rose in the Lower Town, sometimes over the flood debris itself. Greatest damage resulted from the flood at the end of phase III. Large quantities of brick bats, pottery and mud-bricks washed away from the dwellings in the Acropolis are found deposited on the ruined buildings in the Lower Town, and more so in the street and open drain between Blocks A and B. Thus went on the process of levelling up the town. Lanes and streets were also covered with flood-borne debris necessitating rebuilding floors and houses at higher levels. The cuttings SRG 2 and SRG 3,

especially the sections looking east (pl. X) and south (pl. XIX) reveal the character of the successive constructions made in the Acropolis as well as the Lower Town. Each phase of building activity is separated by flood-borne debris. The shrinkage of the town and the decline in the standards of construction in phase IV are in striking contrast to the excellent drainage system and neatly constructed houses of phase III. Further shrinkage of the habitation area and the rickety houses and drains of phase V suggest impoverished conditions.

Five important sections have been referred to here. The section looking east (pl. X) runs from north to south along Street I in the Lower Town and across the Acropolis, thus correlating the successive phases of construction in the two main centres of habitation. The section looking south (pl. XIX) connects the dock with the warehouse, Blocks B and E and the flow-channel of the river. A third section (pl. XXIV) connects the cemetery with the habitation area, while the fourth one reveals the constructions made near the dock and the havoc wrought by flood.

2. SECTION LOOKING EAST (pl. X)

This section commencing from the northern extremity of Block A in SRG 2 runs along Street I and Block B in the Acropolis exposing to view the drains, houses and platforms of various phases and touching the western margin of the warehouse in SRG 3 and finally cuts across the southern peripheral wall. The total length of the section is 1100 ft. out of which the more important portions are illustrated. This is the first section ever cut right across a Harappan town from one end to the other without a break in order to correlate the structural phases and ascertain the plan and purpose of the construction of the masive platforms some of which were supposed to be protective walls against enemies. The present sections prove that the platforms were anti-flood measures.

For purposes of convenience the structures are referred to in the order in which they appear in the section proceeding from north to south. Detailed descriptions of important buildings are given in the next chapter. Here the emphasis is on the various phases of construction and the relative position of the buildings.

A. Nullah and Northern Wall

Layers of silt and gravel in the bowl-like depression noticed in SRG 59—SRG 60 (pl. XIA) at the northern end of the section clearly establish that water used to flow in a channel close to the peripheral mud-bund of phase I. Gravel has accumulated in the bed of the nullah and layers 6 and 7 dipping southward consist of silt with a patch of sand in the northern half. Layers 5 and 4 comprise of compact silt. Obviously the original flow-channel of the nullah was silted up once at the end of phase III and again at the end of phase IV. The layers 6 and 7 in the eastern section are similar in composition to layers 7

and 8 in SRG 2 which seal the damaged brick revetment of the northern peripheral wall (pl. XIB). This damage was due to a flood in the nullah in phase IIIb. Layer 9 in SRG 2 forms the toe of the mud-bund of phase I extending northwards upto the nullah. Thus it is apparent that the mud-bund was built as early as phase I alongside the southern bank of the nullah. It is also evident that the mud-bund was heavily damaged and the breaches had to be mended by adding eight courses of burnt-bricks in phase II and the height had to be increased by adding a few courses of bricks. The close proximity of the nullah necessitated reinforcement of the mud-bund with burnt-bricks unlike on the southern side where the damage was mended with mud-bricks. The top of the burnt-brick wall along the nullah is 4 ft. 2 in. wide with its outer face built in plumb and the inner face supported by buttress walls at intervals (pl. CXIVB). Its close similarity in construction and dimensions to the walls of the dock and the occurrence of an anchor-stone near the posthole suggest boats used to be anchored in the nullah also.

B. Block 'A' (pl. XII)

The southernmost structure in the Lower Town is what appears to be a workshop of coppersmiths as suggested by a furnace (pl. LIVA) and copper slag found here. To the north of the smithy are the remnants of a brick-paved path, stumps of two brick pillars (?) and a mud-brick platform extending upto A34-B33. The mound slopes steeply towards the north, due to heavy erosion here the fall being nearly 5 ft. within a distance of 70 ft.

The evidence for occupation in phase I is offered by a flood-borne debris comprising silt and potsherds in layers 10 and 11 underlying the platform of phase IIa, but no structural remains of phase I are found anywhere between B26 and B34. The stumps of walls built on a mud-brick platform of phase IIa (4a)[1] laid in layers 8 and 9 on the eastern margin of Street are seen between C27 and C30, but the platform itself is washed away at its northern end. A drain (4c) built on the platform discharges water from the house into soakage jars (4d) placed one over the other adjoining the burnt-brick veneering (4b) of the platform in Street 1. Originally the houses stood about 3 ft. above the road level at the top of layer 8.

Further north partial plans of structures belonging to phase III and built over the debris layer 6 could be made out in B34-B31. A brick-paved bath (85) laid bare in A34, two stumps of brick pillars noticed in A34-B34, a platform and drain occurring in B32 (87-88) are not projected in this section. However two mud-brick houses (91 and 92) laid in layer 6 in B30-B28 can be seen. Layers 6, 7 and 8 comprise of flood debris, silt and disintegrated mud-bricks. Layers 5 to 2 are also made up of debris. They are comparatively loose and contain less pottery and bones but more calcareous nodules. The houses were built in a straight row along the Street in phases II and III (pl. XIIIA). A large house with a verandah and six rooms (93) laid bare in C26-C27 and B26-B27 has two rectangular projections in the street (pl. XIIIB). A soakage jar is embedded in one

[1] The structure number is mentioned in brackets.

while the other served as a flight of steps. Another house built adjoining Str. 93 is considered to be a wealthy merchant's residence. It consists of six spacious rooms extending into C26, C25-B26-B25 and A26. Nine disk-beads of gold with axial tubes (pl. CCXCVIB), sherds of the Reserved Slip Ware, two steatite seals, chert blades, a cubical weight and a painted jar were found in the house. Both the houses are built on a mud-brick platform raised over rammed debris and terracotta balls in layer 6.

After the destruction of the town at the end of phase IIIb rickety houses came to be built in phase IVa on flood debris but without a plinth. This becomes evident from a house (149) with its low foundation laid in layer 4 in C26-C27. The composition of the layers in this sector is not very much different from what is seen in C30-C34. Layer 11 overlying natural soil consists of buffish silt, while layers 8 to 10 comprise debris of houses, silt and sand. Layer 7 is a uniformly thick deposit of loose silt accumulating against the platform (4), whereas layer 6, consisting of disintegrated mud-bricks, rolled brick-bats and pottery, seals structures of phase II. An enormous number of terracotta balls, pottery, bones and other small objects are found in layers 4 to 6 which consist of silt etc. deposited by the great flood at the end of phase IIIb. These layers have been levelled up and rendered compact by ramming broken terracotta balls etc. for laying foundations of houses in phases III and IV. Layers 2 and 3 comprising of clay and calcareous nodules and dipping towards the north are loose.

Structrual remains of phase V are encountered in A27-A28 and B27-B28. Two clusters of small brick-paved sinks with interconnecting drains assignable to phases Va and Vb are noticeable here. The drains (184 and 197) emanating from these structures are seen in the section. They have their foundations laid in layer 2 which is a loose deposit of calcareous clay accumulating over layer 3 of phase IV. There is no time-lag between phases IV and V as can be seen from the unweathered strata.

The most important grid wherein all the phases of structural activity except the first one can be seen at one place is C 25 (pl. XIV) which is therefore considered as an index trench. Each phase is separated from the preceding and succeeding phases by an intervening layer of habitation debris deposited by flood or due to other causes. This provides the basis for distinguishing clearly one phase from the other all over the Lower Town and, to a great extent, in the Acropolis also. Here, layer 15 consisting of compact buffish silt hardly yields any human artifact except a few rolled potsherds which must have sunk from the succeeding layers 13 and 14 which represent the habitation debris of phase I. Besides pottery, terracotta balls and cakes, fragments of bones and shell objects occur sporadically in these layers which vary in thickness in different sectors and consist of disintegrated mud-brick material. Patches of sand and fine alluvium are also noticed in layer 13. A mud-brick platform (6) of 8 courses of bricks assignable to phase IIa is built over the flood-debris. Owing to the presence of later structures it was not possible to trace fully the plan of the buildings of phase IIa. Layers 11 and 12 which strike against a bath and kitchen (7 and 8) of kiln-burnt bricks built in phase IIa in B 23-C23 (pl. XVA) comprise loose brownish earth with patches of ash, brick-bats etc. Although the foundation trench of the kitchen is dug deeper into layers 13 and 14 it is found to be contemporary with the structure in C 25 and is sealed by layer 10 in which buffish clay and flood-debris are noticed. Houses

must have been built in phase III on the eastern margin of Street I between C 19 and C 15 as indicated by remnants of structures in B 19 etc. The superimposed layers, namely, 9 and 10 consisting of flood-debris are cut into for placing a soakage jar (93 g) near a mud-brick house (94a) of phase IIIa in C 25. The mud-brick platform on which the house (94a) stands is built over layer 9. Over the eroded surface of this platform another platform (133) is found superimposed and, together with the drain (134) it indicates the occupation level of phase IIIb. The latter platform is sealed by layer 7 and the drain itself by layer 6. In composition these layers do not differ much from layers 9 and 10. Buffish mud-brick material is seen in both. A soakage jar (150) is laid in layers 6 and 7 to receive sullage water from a drain of phase IVa. The rickety bath and mud-brick floor of the house noticed in C 25 extend into B 25 also. A mud-brick wall (152) running east-west and extending into B 24 has its foundation laid in layers 6 and 7. The common floor suggests that this wall belongs to the same house to which the drain and soakage jar (150) belong. Once again a flood destroyed the township in phase IVb as indicated by layers 2 to 5A in the eastern section between B 23 and B 20, where the flood-debris is nearly 2 to 3 ft. thick.

The Lower Town was also maintained clean as indicated by the large jars embedded in bricklined pits for receiving sullage water. They were cleaned periodically in phases IIb and III. In phase IV, however, soakage jars with broken bottoms permitted water to seep into the ground. This arrangement continued in phase V but the jerry-built drains occasionally encroached on the street.

A bath and drain (188) built with brick-bats in C 24 and encroaching on the street have their foundations laid in layer 3. They are a rare instance of encroachment and of an extremely poor standard of construction. It must however be said to their credit that the inhabitants still thought of the sanitary arrangements despite their poverty. This is a Harappan trait. The gap in the row of houses of phase II to IV between C 25-B 25 on the one hand and C 23-B 23 on the other suggests that lane ran eastward from Street 1.

Next comes a house (7) with an excellent bath and kitchen built in phase IIa in B 23-C 23 on a 4 ft. high mud-brick platform with a veneering of burnt-bricks (pl. XLIIA). The foundation of the house is laid in layers 13-14. The floor of the kitchen is made up of burnt earth with patches of ash. The smoke covered potsherds recovered from here suggest that the structure formed the kitchen of the house. Two large jars with wide mouth were found embedded one over the other in the street close to the veneering of the western wall to receive water from a drain. Other adjuncts of this structure are referred to in the next chapter (below p. 89). An enormous quantity of debris consisting of disintegrated mud-bricks, terracotta balls, brick-bats and bone fragments deposited by floods at the end of phases II and III forming layers 10 to 7 has accumulated over the stumps of wall of bath and kitchen. Mud-brick houses are built over the debris in phase IV between C 22 and C 18 in continuity of the houses built in the northern half of Block 'A'.

A mud-brick house (153), of which two rooms are visible, has its foundation laid over the debris rammed in layer 7 after cutting into layer 6. The superstructure has completely disappeared owing to the disintegration of the soft mud-bricks used in the construction. Another building (154), also of mud-bricks, built adjoining it is considered to be a coppersmith's workshop (pl. XXXVIIB). It has two rooms in one of which

a rectangular brick furnace, a stone anvil and two terracotta crucibles were found. Among other finds recovered from the workshop and the adjacent house are a Harappan seal, a copper chisel and fragments of copper. Layers 2 to 4 comprising loose earth, pottery, bones and ash in varying proportions seal the structures of phase IVa. The purpose of having a niche-like recess in the western wall of the coppersmith's workshop is not clear. A gap of 6 ft. between structures 154 and 155 marks a lane joining another lane running north to south parallel to Street 1. Two jars lined with bricks are found in lane 4, into which a covered drain (SRG 16) opens. The structural remains of phases II and III laid bare in B 19 and B 20 are not seen in the section. An altar with remains of animal sacrifice (pl. CCCI) noticed in B 19 is assigned to phase III. A large house (155) built in phase IVa on a 3 ft. thick mud-brick platform (155a) extending over C 18-C 20 and B 18-B 20 had more than four rooms to which additions were made in phase IVb. The strata intervening between structural remains of phases II and IV are found to contain disintegrated mud-bricks, silt, pottery etc. Layers 3 and 4 sealing the houses and platform of phase IV are loose and ashy in colour. Layers 6 to 8 sealing structures of phase III are very rich in antiquities owing to the fact that the debris comes from a phase when the Lothal folk were very prosperous. As such, Indus seals, painted vessels, cubical stone weights and copper objects are recovered in large numbers from the debris. A mud-brick platform, 3 ft. high, built over layer 7 extends from B 20 and C 20 to B 18 and C 18. The house (155) standing on it has four rooms in one of which two large jars and two mud-altars are encountered. One of the altars is circular in plan and the other rectangular, and both appear to have been used for ritualistic worship of fire (below p. 91). The southern wing of a house (155) which partly stands on debris seems to have been added in phase IVb after some damage occurred to this part in phase IVa. A burnt-brick drain (135) built in the underlying debris belongs to phase IIIb.

Much damage was suffered by the structures situated between B 17 and B 5 at the southern end of Block 'A' in phases II and III as is borne out by 10 to 12 ft. thick flood-borne debris accumulating here (pl. XVB). Except for a platform (11) in B 15 - B 14, two mud-brick houses (12 and 13) in B 12 and B 10 of phases II and a mud-brick floor of phase IV all the buildings were completely wiped out of existence. Deep pits have been cut into the debris of phase III in phase IV. Several factors contributed to the total destruction of the houses situated immediately north of the Acropolis. First, flood-water rushed into the Lower Town through the open drain which carried sullage water from the Acropolis into the dock. Secondly, houses were built on a comparatively low platform or on debris in Block 'A' thereby subjecting them to inundation more frequently. The debris of the houses built on the Acropolis was washed down the high platforms at the end of each phase, as is clear from the section between B 18 and B 17 (pls. X and LXXVA). Besides brickbats, silt and occasional patches of sand, enormous quantities of pottery, bones, terracotta balls and calcareous nodules have been deposited by the recurring floods. The layers in the earlier levels are more compact than those in the later levels.

The greenish clay accumulating in a pit close to the northern buttress of the Acropolis suggests water-logging for a long time.

Between B 17 and B 5 the earliest occupation deposit is represented by layer 14 which is 2 ft. 6 in. thick and comprises loose earth, silt and pottery. Fifteen to twenty courses

of mud-bricks of a platform (11) raised over the flood-debris in phase IIa are seen in B 15—B 14. Layers 10 to 12 which seal this platform are compact and have yielded several important antiquities. A mud-brick house built in phase IIb over the debris was destroyed by a flood in phase III along with other buildings. It is not necessary here to go into great details regarding the composition of these layers as all of them are loose and full of debris. The layers 11 to 29 between B 5 and B 7 dip steeply towards the north, but rise again between B 8 and B 13. Traces of two cross walls and a long wall built on a platform in phase IIa between B 12 and B 10 can be seen in layer 17. A soakage jar embodded near a circular brick enclosure (3) laid in layer 20 suggests the existence of a house with a drain discharging water into a jar in B 12. This is the only evidence of structural activity in phase I in this sector of the town. The mud-brick house with two rooms (12) laid bare between B 8 and B 9 is assigned to phase IIb, as it is built over layer 14. A mud-brick floor of one course of soft bricks laid over layer 5 in B 7 appears to have extended from B 8 to B 5 and is assignable to phase IVa. The presence of coarse sand, brick-bats and heavy potsherds in the early strata is suggestive of the flood-waters rushing into the town with great force while the thin horizontal bands of fine sand and silt in the later levels suggest a slightly slow-moving current in the same phase. The stagnation of water is evident from a deposit of greenish clay and the water-logged potsherds in the main drain. The flood-debris of phase IV is seen in layers 2 to 5. Lastly, the occurrence of a few sherds of the Prabhas Ware assignable to phase V in layers 2 and 3 on the eastern slope is highly significant.

C. Block 'B'

The section now cuts across the Acropolis consisting of three blocks which, for the sake of convenience, are termed here B, C and D, each standing on extensive platforms of mud-bricks or mud or both. The ruler of the town lived in Block B, while Block C served the purpose of a warehouse. Some scholars hold the view that it was a granary. This aspect is dicusussed elsewhere (below p. 113); A 3 to 4 ft.-thick habitation debris of phase I (layers 11 to 13) underlies the mud-brick platform in Block 'B' where a mud-brick structure of phase I is noticed in SRG I(pl.XVIB). The residence of the ruler stood on the highest platform built in phase IIa as a safeguard against erosion. As a measure of economy the earth excavated from the basin of the dock was packed between thick box-like enclosures of mud-bricks. The northern arm (14a) of this enclosure standing on the debris of phase I is 44 ft. 6 in. thick and 12 ft. high between B 2 and 4. Kankar (calcareous earth) and black clay were rammed on the inner face to a height of 9 ft. over which a mud-brick platform was again raised in level with the four arms to a height of 3 ft. thus forming the central block (Block B) of the Acropolis. The outer face of the platform (14a) is slightly battered. A buttress wall, 9 ft. 7 in. in height, and equal width at the base, and 4 ft. wide at the top, rests at an angle of 10° against the platform. The lack of proper bond between the two and the varying depths of the foundations suggest that the buttress-wall was built later than the platform. Both of them were however damaged heavily by three successive floods in phases IIc, IIIb; IVa (pl. LXXV) and IVb (pl. XVIA). The mud-brick

platform was built in three stages as indicated by the intervening horizontal bands of mud-mortar at two levels. Initially the three stages of construction were considered as representing separate phases of occupation,[1] but the final correlation of the buildings in the Acropolis with those of the Lower Town has revealed that all the three stages were completed in phase IIa. Subsequently, twelve courses of mud-bricks are found to have been added above 28 courses in phase IIIa after the flood at the end of phase IIc shaved off a portion of the platform. This addition is apparent in A4—A5. A ramp of mud-bricks was built on the southern face of the northern wall as a temporary measure to facilitate carrying bricks to the top of the wall. Subsequently, it was covered up by kankar and clay rammed within the box-like enclosure formed by the massive mud-brick walls on all the four sides. Five courses of bricks laid over the mud-filling provided a firm basement for the houses raised in the central part of the block (pl.V). Everything was well planned before constructing the ruler's mansion on the platform. A gap was provided in the northwest corner of the box-like construction to build an underground drain along the inner edge of the western wall to drain off sullage and storm water.

Layers 12 and 13 represent the habitation debris of phase I in SRG 1 and SRG 3 and layer 11 is a flood-borne debris deposited at the end of this phase. Layer 10 consists of buff kankar and patches of black clay rammed to a height of 9 to 10 ft. (pl. XVIB). The occupation deposit on the floor of the houses raised on this platform is represented by layers 7 and 8. Layer 9 consists of kankar rammed all round the platform. A mud-brick house (25) built here is found to have been completely washed away leaving only stumps of two walls which do not help in making out the plan. There was a subsidence in the foundation of the houses built on the earth-filling in phase IIa necessitating reconstruction of drains and raising the floor levels in phase IIb. Layers 4 to 6 represent the debris of the houses damaged in phases IIb and IIc. Large-scale brick-robbing has also contributed to the disappearance of burnt-brick structures including one of the houses with a bath (58) built in phase IIa. This fact becomes clear from the robber's trench. The buildings in the Acropolis were served by a neatly constructed drain (15c) to carry sullage water. The roof-bricks seen at the western end of the southern arm confirm that the drain was a covered one. A number of private drains connecting the baths in the houses flanking lane 3 (pl. LVIII) join the main drain which continued to be in use in phase III also. Some remnants of burnt-brick structures standing on the southern margin of the lane can still be seen here (pl. LVII). One of them stood on a platform built in phase IIb (73). Two walls of burnt-bricks (114) standing on the other side of the lane are assignable to phase IIIa. A soakage jar noticed near the mouth of the drain was added in phase IIb when the floor level of houses and baths was raised.

A flight of steps (104) leading to the mud-brick houses standing on the platform was built in phase IIIa, its alternate courses being laid on edge (pl. XXXIVB). The rammed earthen floor at the foot of the steps and the brick-paved bath with a soakage

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[1] S. R. Rao, 'Excavations of Lothal' *Lalit Kala* nos. 3-4, (1956-57) pp. 82-89; and *Indian Archaeology,* 1954-55, p 84; pl. XXVII, fig. 3.

jar are some of the evidences to show that houses were built in phase IIa on the low platform of mud-bricks raised over the earth-filling. Of architectural interest is a mud-brick structure with a vaulted roof built in SRG 1-SRG 3 in phase IIIa (110). Its foundation is laid in layers 4 to 6. The top courses are built projecting on the interior (fig. 10). The floor of the chamber and the inner face of the walls are slightly burnt and the roof has partly collapsed. Layers 2, 2A and 3 striking against the structure are thin but loose consisting mostly of disintegrated mud-brick material, ash etc.

Structural activity was very much limited in phase IVa. A floor of brick-bats seen in the section looking south (pl. XIX) is assigned to this phase. Street 3 is supposed to have served two rows of houses running east-west. The northern row was connected with a drain (15c) and the southern row with two drains (28 and 29) built parallel to the former partly on a mud-brick platform and partly on the earth-filling. Forty courses of bricks are visible on the southern face of the platform (pl. XVIIA) on which houses flanking Street 2 stood. Ten drains (30 to 39) were built in a row connecting an equal number of brick-paved baths of houses (pl. LXII) with two public drains (28 and 29) in Street 2. The houses, most of which have been washed away, stood on a mud-brick platform while the drains were laid on the earth-filling. As the main drain is mostly robbed of its bricks, only a few remnants of its floor (29) and walls can be seen here and there. Between the southern arm of Block B and the northern margin of the warehouse and again between Blocks 'C' and 'D', the earth-filling consists of kankar and clay. Occasionally sherds of Harappan and associated pottery and other objects are found in the make-up of the platforms. The stratified deposits of occupation sealing and underlying the platform have yielded the Harappan Wares, the Micaceous Red Ware, the black-and-red ware, Indus seals, cubical stone weights, chert blades etc., establishing thereby that the Harappans were present in all the phases.

D. Block 'C' (Warehouse)

Unlike the platform in Block 'B' which is partly made up of bricks and partly of earth-filling, the platform in Block 'C' measuring 160 ft. × 135 ft. is a solid structure of mud-bricks. Its extant height is 11 ft. 6 in. over which kankar is rammed to a thickness of 1 ft. 6 in. (pl. XVII). Twelve cubical blocks in three rows of four each stand in the north-west corner of the platform which itself overlies the habitation debris of phase I represented by layers 4 and 5 and comprising of silt, blackish clay, potsherds, bone fragments etc. A mud-brick wall traceable to a height of five courses built over the natural soil is the only evidence of structural activity in phase I in this sector of the town. Buffish alluvial silt formed the natural soil, but fine black clay overlying it in some places was also available in phase I for building a mud bund around the village. Each of the twelve blocks was originally 12 ft. square on plan and 3 ft. high, but floods damaged many of them in phases III and IV along with the main platform (pl. LXXIX). It is highly probable that over the entire Podium there stood 3 ft. high blocks of 12 ft. square, the access being provided by the earthen ramps running along the western and northern margins (pl. LXXXII). Perhaps

the peripheral platform on the south and the wharf on the east were used as loading platforms. It is highly improbable that the inhabitants would have wasted so much labour and material in building an enormous platform of mud-bricks only to provide access to the extant blocks covering an area of only 2500 sq. ft out of a surface area of 20,000 sq. ft. of the podium.

The small blocks formed the basements of a warehouse, the brick-paved channels serving as passages. During the excavation large quantities of ash and hundreds of lumps of burnt clay bearing marks of reed were found in the channels. Other finds included terracotta sealings and balls. The sides of the cubical blocks have turned red owing to contact with fire, but the core is unaffected. The mud-plaster on the walls was found to contain rice-husks. The reasons for considering the blocks as remnants of a warehouse which might have been used in phase IV for firing small terracotta objects, especially the clay sealings, are stated elsewhere but originally they formed part of the warehouse. Some reconstructions seem to have been made in phase III by reinforcing the northern edge of the blocks with burnt-bricks. After the great damage caused by the flood in phase IIIb the structure ceased to serve the original purpose. A brick-paved floor and a drain built in phase IV on the flood-debris to the south of the damaged blocks suggest the use of the warehouse for a purpose different from the original one. It was completely abandoned in phase V along with other structures in Blocks B and D.

E. Southern Peripheral Wall

The peripheral mud-bund which protected the village from floods in phase I extended on the southern margin also. It is 42 ft. wide at the base and 40 ft. at the top, the extant height being 5 feet on the southern and eastern margins. The flood at the end of phase I caused wide breaches in the bund which were mended with mud-bricks, and the height was also raised in phase IIa by adding 3 to 4 courses of bricks on top as an additional precaution against floods. The warehouse was further protected by ramming clay and kankar between the platform and peripheral wall (pl. XVIIIA). Layers 4 and 6 underlying the kankar-filling and warehouse-platform represent the occupation debris of phase I. A thin layer of silt containing potsherds seals the eroded surface of the warehouse and peripheral wall. A sizeable quantity of pottery, bone and disintegrated mud-brick material washed down the Acropolis in phases II and III has accumulated in a drain in SRG 55 outside the southern peripheral wall.

3. SECTION LOOKING SOUTH (pl. XIX)

The second main section runs from east to west across the dock, Blocks 'C' and 'B' of the Acropolis, Block 'E' of the Lower Town, and finally cuts across the western peripheral wall on the flow-channel of the river. The total length of the section from dock in the east to the river bed on the west is 1223 ft. out o which the more important

parts covering a length of 650 ft. have been shown in pl. XIX. In the first instance the warehouse was laid bare in SRG 3 exposing subsequently the dock on the east and Block 'B' on the west in the same cutting. Finally the trenches SRG 6 and SRG 43 were sunk on the western slopes to connect the Lower Town with the river bed. The various phases of occupation and structural activity are determined with reference to the phases of structural activity noticed in the Acropolis and the Lower Town especially in SRG 2, C 25. Phases I to IV are clear in SRG 1 also which forms the connecting link between the eastern and southern sections running across mound.

A. Dock

The strata and structures are referred to in the order in which they are seen in the section commencing from the eastern extremity of the dock. Fifteen courses of burnt bricks forming the foundation of the eastern embankment wall (49c) of the dock are laid in buff kankar i.e., layer 7 which forms the natural soil. The foundation is 5 ft. 6 in. wide and the superstructure 5 ft. wide upto 3 courses and 3 ft. 10 in. further above. In all 31 courses of bricks including fifteen of the foundation are visible accounting for a height of nearly 8 ft., but originally the walls must have been much higher. Forty-two courses are intact in the case of the western embankment wall, which at present is 10 ft. high, but its top must have been in flush with the wharf on the western margin of the dock, which would mean about 11 ft. above the floor of the basin.

Traces of two retaining walls, one on either flank of the inlet channel, are seen on the outer face of the eastern embankment (pl. XVIIIB). Other structural details are given separately. The flood-waters must have rushed into the dock through the first-stage inlet in the northern embankment in phase IIIb as indicated by the large breach and flood debris in the northern section (pl. CVIA) and by the direction of the fall of bricks.

After excavating the basin of the dock in phase IIa the builders increased its depth by erecting brick walls on all sides. At the eastern end the foundation of the southern wall is laid in layer 7 comprising buff kankar. Outside the walls of the dock, pottery is found in layer 6 consisting of black clay. The presence of coarse sand, bricks and pottery in layer 5 indicates the high velocity of the flood-waters, while the succeeding layer comprising fine sand and silt (pl. CVIIIB) suggests that there was a steady flow of water after a while. These layers are however hidden by the southern wall and spill-channel in the section illustrated above. The spill-channel, 3 ft. 3 in. wide, was built for the excess water to escape. A vertical groove, 8 in. wide, has been provided on either side of the opening for sliding a wooden door (fig. 19) with a view to close the channel at low water so as to maintain the necessary water level in the basin and ensure the floatation of ships. A suggestion put forward by some scholars is that the channel was a drain for lettings ullage water into the dock but no drain emerging from the Acropolis is found connected with the channel. The embankment walls are absolutely vertical on the inner face and no steps or offsets are provided. On the outer face the western

embankment wall has three offsets whereas the eastern wall has but two. The foundation in the former case is 6 ft. and in the latter case 5 ft. 3 in. The greater thickness of the foundation of the western wall may be due to the fact that it had to withstand the water pressure inside the basin as well as the pressure of the mud-brick wharf from outside. Layers 5 and 6 comprising of buffish silt and kankar respectively have been cut into for laying the foundations of the wall. Before doing so, the breaches in the mud bund were mended by filling in mud-bricks (14c). The flood at the end of phase IIc damaged the enclosure walls and wharf, both of which had to be repaired in a hurry (pl. C). Kankar was also rammed between the mud-brick wharf and the burnt-brick wall. Layer 3 is thus found to be a calcareous deposit whereas layer 2 is full of brick-bats, pottery and bones besides disintegrated mud-brick material. An enormous quantity of pottery characteristic of Period B washed away from the houses which were built on the slopes is found deposited in the layers overlying the damaged walls in the southern half of the dock. As the Acropolis was not occupied in Period B the debris accumulated at the northern end of the basin hardly contains any pottery of the Late Harappan period.

The western arm of the dock is better preserved than the eastern owing to the support given against water pressure by the mud-brick wharf built over the mud bund. The foundation of the western embankment wall of the dock is laid after cutting into the bund as well as the underlying layer 5 and into buff kankar which forms the natural soil. A buffish silt is noticed in layer 5 and black clay in the bund (layer 4). Two offsets were provided in the foundation of the western arm of the dock and one in the superstructure (pl. XXA). Out of 42 courses of burnt-bricks 11 courses were added in phase IIIa after the embankment wall was damaged in phase IIc. The mud bund damaged in phase I was reinforced and widened with mud-bricks to serve as a platform or wharf (14c) for hauling goods. It is 86 ft. wide and 800 ft. long. The damage suffered by the wharf was made good in phase IIIa by laying a few courses of bricks and by ramming kankar in the breaches in phase IV. Layer 3 consisting of habitation debris of phase I underlies the warehouse platform and strikes against the edge of the mud bund which is a contemporary structure. The intervening space between the warehouse and wharf is rammed with kankar to effect economy in the use of bricks. The warehouse platform (41) is heavily eroded on the eastern (pl. XXB) and southern sides. The eastern arm of the mud-brick platform of Block B extends upto Street 2 and joins the wharf. The space between the warehouse platform and the southern arm of Block 'B' is also filled with kankar. In the western half, layer 7 underlying the warehouse platform is similar in composition to layer 3 underlying it in the eastern half.

B. Warehouse (Block 'C')

The massive platform on which the warehouse stands measures from east to west 135 ft. and its maximum height upto the sealing layer 4 comprising kankar is 13 ft. Sixteen courses of mud bricks in the lower level are made of fine buffish alluvial clay which can resist water action while the remaining 22 courses are of block clay which disintegrates

easily. The cubical blocks forming bases of the superstructure are built in three rows of four, each commencing from the northern edge of the platform but most of them are eroded (pl. XXIA). They were originally 3 ft. 6 in. high. The mud bricks used in their construction are 18 × 9 × 4 to 12 × 5s × 3 and have turned red owing to burning. Three drain-like grooves built with burnt-bricks are seen at the northern extremity of the passages between the cubical blocks. Ash, terracotta lumps, cakes and balls were found in these passages, all of which were originally paved with burnt-bricks. The remnants of brick pavement are still visible. As the brick-lined grooves do not run continuously they seem to have served as slits for sliding doors to close the passages, but not as outlets for water. A mud-brick wall of phase I sealed by layer 8 and having its foundation laid in the natural soil underlies the north-west corner of the warehouse platform.

Potsherds, bones and silt occur in layer 8, while layer 7, almost similar in composition is rather less compact. Layer 9 consists of blackish silt, and a few potsherds have sunk into it from the habitation debris of phase I represented by layers 7 and 8.

C. Block 'B'

The section now cuts across the earth-filling between Blocks 'C' and 'D'. Corresponding to the two stages of construction of the platforms of Blocks 'B' and 'C' in phase IIa the earth-filling was also made in two stages, the lower one being buffish kankar (layer 6) and the upper one black clay with patches of kankar (layer 4). The two parts of the filling are separated by a thin deposit of silt, rolled potsherds and bone fragments (layer 5).

The structures standing on the northern margin of lane 3 laid over the kankar-filling in Block 'B' between SRG-3, BX-1 and M 4 are shown in the section. The composition of the various layers in Block B is not repeated here as it has been described while referring to the section looking east. The superstructures have been mostly washed away by flood leaving only the foundations of walls and drains or mud-brick plinths and floors of houses built on the make-up of the platform. It is from these remnants that the size and alignment of houses and the lay-out of the streets and lanes have been inferred. The problem of assigning structures to the various phases is complicated owing to the reconstructions necessitated by the subsidence of structures as in the case of nos 21 and 22. The alignment of houses and the various phases of constructions made over the earth-filling are determined with reference to the arterial drain running east-west (15c), only a small portion of which is visible in this section. A bath and drain having two inspection chambers (21a and 22a) built in phase IIa have their floor paved with polished bricks which sank owing to the subsidence of the kankar-filling. This necessitated raising the floor level by placing another course of bricks on edge. Of the two inspection chambers (pl. LXIV) one (66) was added slightly later to the subsidiary drain connecting the bath with the main in phase IIb. Another drain running north-south (63) built in phase IIb to the east of the bath (21) and joining the public drain (15c) at right angle seems to have been connected with a bath. The bricks-on-edge (72) laid parallel to the main drain on its northen margin suggest the

limits of the houses built north of lane 3 corresponding to the row of houses on its southern margin (pl. CII). The main drain (15c), which was fully covered, is joined by several subsidiary drains connecting the baths built at close intervals on either side of lane 3. More than once this lane was encroached upon by the wall running east-west (112) in phase IIIa. Its foundations is laid in layer 5. An earlier house is indicated by a 2 ft. 3 in. thick wall of burnt bricks (65) assignable to phase IIb, which runs parallel to lane 3 on its northern margin and then takes a turn to the north. The foundation of the wall is laid in layers 7 and 8, the former sealing a bath (19) and the latter being contemporary with it. After the house (65) was destroyed another building with a water-chute (65a) and raised floor was superimposed over it in phases IIc and III. The water-chute is connected with the main drain (15c) through the inspection chamber (66a) of phase IIb. It is difficult to guess the original plan and purpose of construction of this important structure. Two cross walls of mud brick built in phase IIa end the burnt-brick wall north of. The enclosed area is paved with mud bricks and a mud-brick platform of four courses (25a) is visible here (pl. XXIB). A brick-paved bath with an outlet in its northern wall (19) is also laid bare. Another brick-paved bath (20) with a soakage jar embedded near it in the mud-brick floor is assignable to phase IIa. A small rectangular enclosure of burnt-bricks (113) built in eight courses over the rim of a large jar served as a manhole in phases III and IV. The said jar is laid in a pit cut into layers 4 and 5 and the top of the walls indicates the working level of lane 3 in phase III. The floors of houses of this phase are built slightly lower.

Layer 2 is cut into for the foundation of houses of phase IV. Patches of floors paved with burnt bricks are seen further west of the massive burnt-brick wall (65). Layers 2 to 6 contain debris of the houses destroyed by flood in phases II and III.

The western part of the house (65) was washed away by a flood as can be made out from the debris of brickbats deposited in a large breach in the make-up of the platform (pl. XXII). The northern arm (15b) of the drain in Street 3 was also damaged simultaneously by the flood and had to be closed subsequently. The breach in the platform was mended and houses were rebuilt in phase IIc. Layer 7 consists of clay and kaṅkar rammed over the flood debris and layer 8 is a silt deposit. Three mud-brick structures (82, 83 and 84) and some stray burnt bricks are the only remnants of the houses built over layer 6 in phase IIc. They suggest two floor levels, with which layers 4 and 5 are contemporary. A floor of burnt-bricks (119) built over layer 4 and a mud-brick house (120) are assigned to phase IIIa. The alignment of the latter can be made out from a soakage jar (121) embedded in an octagonal structure of burnt-bricks (pl. LXXIVA). Originally, the northern arm of the main drain (15b) extended eastward beyond this point in lane 4. The mud brick walls of the house (120) running east-west and north-south are 3 ft. thick while others are 1 ft. thick. The fourth phase of building activity in the Acropolis is represented by a floor of brick-bats built over the flood-debris in A 2 encroaching on lane 3. The existence of the southern arm of the main drain (15c) was totally forgotten in this phase as indicated by the two soakage jars embedded in the flood-debris of phase III They received sullage water from the houses of phase IV in lane 3.

The northern arm of the main drain in lane 4 is 5 ft. wide and the bricks from its roof and floor are missing. It was joined by a small drain at its eastern end in phase IIa,

Burnt bricks found near the drain and sealed by layer 6A are assignable to phase IIc. The present height of the walls of drains 15a and 15b indicates the original working level. The northern arm (15c) of the main drain covered with flat bricks is narrower than the other arms which are likely to have had a vaulted roof as was the case with the main drains in Harappa and Mohenjo-daro. Lane 2 indicated by drain 15a was flanked by houses having brick-paved baths some of which are still intact. The drain is 2 ft. 6 in. wide internally and its floor is paved with polished bricks.

A source of drinking water to the residents in the Acropolis was the well built in phase IIa after digging into the occupation debris of phase I (layers 11 and 12) and the natural soil. The water level was reached in the course of the present excavation at a depth of 22 ft. from the top of the mound i.e., about 5 ft. below the present ground level of the surrounding fields, but brick courses were found to continue for more than 3 ft. below the water level, and further digging was stopped for fear of scouring effect of water. The ancient water-table must have been about 10 ft. below the present ground level as suggested by the sill of the spillway of the dock. As far as the use of the well goes, three working levels could be made out. The brick-paved floor (16b) near the drain (15a) adjoining the well marks the working level of the well in phase IIa. Only seven courses of bricks of the parapet wall above the then working level are intact. Eight courses of bricks seen projecting beyond plumb-line were added in phase III when the general occupation level rose. Subsequent to the flood at the end of phase IIIc, some more courses were added in phase IV, of which four are seen overhanging. Radial bricks were used for original construction in phase IIa but not for subsequent repairs. A floor of kiln-burnt bricks noticed in layer 1 marks the working level of the well in phase IV, while layer 2 seals the parapet, which was in use in phase IIa.

The western arm of the mud-brick platform (14a) of Block 'B' is 11 ft. high and 46 ft. broad at the base. The outer face is battered at an angle of 10° and a buttress wall (14f), 6 ft. 6 in. thick, is built abutting it on a low platform of mud-bricks which extends westwards over a length of 24 ft. thus providing a firm soling for the road and a plinth for the houses in the Lower Town. The buildings in the Acropolis, including the massive mud-brick walls, were greatly damaged by floods at the end of phase IIc. This can be made out from a 6 ft-thick flood-debris deposited over the eroded platforms. Layer 3 is assigned to phase III and layer 2 to phase IV both consisting of disintegrated mud-brick material, potsherds etc., washed down from the buildings in the Acropolis. The deposit of fine sand and silt in layers 4 and 6 and the laminations suggest the slow movement of flood-waters while the presence of heavy brick bats in layers 5, 7 and 8 points to a swift flow. The habitation layers 9 to 12 underlying the platform of phase IIa are assignable to phase I.

D. Block 'E'

A low platform of mud-bricks (53) carrying remnants of mud-brick houses built on it is visible at a short distance from the lower platform in Block 'E'. Three rooms of a house (46) in SRG 3, J3-K3 can be made out from the cross walls built in phase IIA on this

platform on the western flank of Street 5 which runs north-south at the foot of the Acropolis. Almost at right angle to it is Street 7 flanked by houses in Block 'E'. Another house laid bare partly in SRG 3 and partly in SRG 6 is also assignable to phase IIa. It has five rooms (53a to 53e) and its walls run in a south-east to north-west direction (pl.IXA). Subsequent to the destruction of the Lower Town in phase IIc no buildings appear to have been raised in the eastern half of Block 'E'. At the western extremity some mud-brick houses were built in phase IIa on a high mud-brick platform (48) which extends upto the peripheral wall in SRG 6. The strata in SRG 6 mostly consist of debris, sand and silt. Layer 2 sealing the platform yields terracotta balls, pottery and loose earth, while layer 3 consists of distintegrated mud-brick material. Layer 4 underlying the platform is composed of buffish slit and debris brought from the habitation area in phase I. The habitation area must have been very limited in phase I and did not extend beyond the peripheral bund, but later on it seems to have spread outside too.

E. River

About a hundred feet west of SRG 6 a cutting 200 ft. long was made with a view to ascertain whether the depression noticed along the western margin of the mound was the original flow-channel of a river or of a creek. As a result, the original flow-channel was laid bare in SRG 43 where pottery painted in the characteristic Harappan style was found in a coarse gravel bed and on the slopes of the river bank (pl. XXIII), confirming thereby that a river was flowing close to the western fringe of the mound in phases I and II. At a depth of 12 ft. the formation of silt-rock (pl. VIIIB) similar to the one noticed in SRG 30 was encountered in the river bed too. It was sealed by successive deposits of coarse and fine gravel. An abnormal flood of long duration is indicated by a 7 ft.-thick deposit of alluvial silt overlying the gravel lens of phase II in which Harappan painted pottery was also found (pl. XXIIIB). Prof. F. E. Zeuner who examined the cutting was of the opinion that the enormous quantity of silt noticed in layer 5 must have accumulated suddenly as a result of a great flood and not due to annual floods. Corresponding to this silt deposit is a layer of silt and habitation debris sealing structures of phase III in D 13, E 13 etc. There is no doubt that an abnormal flood destroyed the township in phase III and again in phase IV. It has not been possible to ascertain the maximum depth of the river bed as the centre of the flow-channel, which appears to be very wide, could not be reached. It is interesting to find that the flood level in SRG 43 on the western flank corresponds to the flood level in SRG 54 laid in the eastern flank of the mound.

4. SECTION CONNECTING CEMETERY WITH HABITATION AREA (Pl.-XXIV)

Six trial pits were sunk on the western edge of the mound in the year 1958 with a view to locate the cemetery, if any, and the results were encouraging. On finding fragments of human bones in the north-west corner, a trench (SRG 8) was laid and systematic digging

was begun in B 1 where the first regular burial was encountered. It is necessary to mention here that the cemetery area is heavily eroded due to floods and cultivation of land, exposing in the process skeletons of the late levels. This has led some scholars to believe that all the burials belong to the post-Indus period. While it is true that a few of the burials associated with evolved Harappan wares and assigned to phase V are later than the true Harappan burials, it should be noted that most of the burials belong to the mature Harappa Civilization. The burial phases are determined with reference to the structural phases noticed in SRG 2, C 25 which is stratigraphically connected with SRG 8. No burial belonging to phases I and II have come to notice so far. The section (pl. XXIV) cuts across the grave-pits containing skeleton nos. 4, 2 3, 11, 7 and 8-9 which include single as well as joint burials. Within a cultural deposit of 4 ft. three burial phases assignable to phases III, IV and V are distinguished. All the three joint burials belong to phase III. Erosion, quick succession of burials of different phases and the disturbance of earlier graves caused by digging for the later ones are responsible for the meagre deposit covering each phase of burial.

The first skeleton encountered lay in a grave-pit cut into layer 1A which is rather loose. The underlying layer is more compact and consists of clay and kankar of darkish colour. The agricultural operations are responsible for the total loss of the skull and limbs. To the north of the first burial is another with skeleton no. 11. The grave pit cut into layers 3 and 3A and sealed by layer 2. A typical dish-on-stand is found placed near the head (pl. CXVIII). Layers 2A and 3 comprise clay and whitish kankar with patches of silt, whereas layers 4 and 5 are compact and consist of buffish silt and fine sand. They have yielded a few potsherds also. A joint-burial containing skeleton nos. 2 and 3 and single burial containing skeleton no. 4 are laid in 3A and sealed by layer 3. The joint-burial was disturbed and damaged (pl. CXVII) while digging a grave-pit for skeleton no. 11. Thus four burials, two assignable to phase III and one each to phases IV and V, are encountered in SRG 2, B 1 within a cultural deposit of 4 ft.

Normally, for single burials a pit 1 ft. 6 in to 2 ft. deep, 2 to 2 ft. 6 in wide and 6 to 7 ft. long was dug. A thin layer of kankar was spread on the floor of the grave pit before depositing the skeleton and funerary vessels. Most of the skeletons are found to have been ceremoniously deposited in their normal direction, namely, north-south with head to the north and legs and hands pressed. This posture indicates that they are all true burials. On the basis of stratigraphic evidence the burials are correlated to their structural phases. Layer 2A separates burials of phases IV and V while layer 3 seals the burials of phase III. The ceramic wares from burials of phase V consist of evolved Harappan types while those of phases III and IV are typically Harappan. The skeleton nos. 6 and 7 found in SRG 8, D 1 belong to phases V and IV respectively. The skeleton no. 6 is laid in a grave-pit cut into layers 1A and 2 and sealed by layer 1. It is assignable to phase V. The grave-pit containing skeleton no. 7 cut into layer 2A and sealed by layer 2 is assigned to phase IV. The grave-pit of the joint-burial with skeleton nos. 8 and 9 in SRG 2, W 28 is cut into layer 3A and sealed by layer 3. Layer 3A here corresponds to layer 6 in P 28—Q 28 and to layer 7 in C 25 which clearly belongs to phase III. Similarly layer 3 sealing the earlier burial corresponds to layer 5 in C 25 which, in turn, seals the mud-brick platform of

phase III. Hence the earliest burial is assigned to phase III. As one approaches the habitation area more of disintegrated mud-brick material, pottery and bones are found in layers 3 to 5. Blackish silt formed due to water-logging in phase I is the main constituent of layer 6 in SRG 8 and SRG 2, while layer 7 in the cemetery area comprises of alluvial silt. A few potsherds seem to have sunk into it from the superimposed stratum. The underlying layer represents the natural soil. But silt and patches of kankar are its chief constituents. The cemetery does not extend east of SRG 2, W 28, and as there is no important structure beyond this grid a length of 122 ft. is omitted in the section. Flood-borne debris and stumps of mud-brick platforms are the only remains of occupation traced here. The layers are thin and dip towards the cemetery. As we go towards Block G they are uniform in thickness and run horizontally.

Two mud-brick houses (192 and 193) ascribed to phase Va are found built over layer 4 between H 28 and L 28 of SRG 2 in Street 9. The occupation deposits of phases II to IV are discernible in this sector of the town in layers 4 to 10 which comprise mostly flood-borne debris. Another mud-brick wall (189b) assigned to phase Va is laid over layer 4 in D 28—E 28. Disintegrated mud-brick material, silt and brick-bats are noticed in layers 1 to 3. Layer 4 is more compact owing to the presence of clay in it. A large pit in E 28, cut into layers 1A to 4, contains brick-bats and silt. Flood-water appears to to have rushed in from the *nullah*. Layers 5 to 7 consist of silt and fine sand, and the laminations suggest the slow movement of the flood-water. All the five phases of occupation in SRG-2, C 24—C 25 are projected in the eastern end of the section with a view to correlate the structural phases with the burial phases. As stated earlier, layers 7A to 12 assigned to phases III to I dip towards the west and underlie the joint-and single-burials of phase III.

Two other sections, one looking north across the dock and showing the inlet of the first stage and the other running along the northern extremity of the public drain in Block 'B' (pl. LIX) are described along with the plans of the concerned structures in the next Chapter.

CHAPTER VII

STRUCTURAL REMAINS

1. INTRODUCTION

The countryside around Lothal does not seem to have changed much during the last four thousand years except for the fact that larger areas of land have been brought under cultivation in recent years owing to the shrinkage of swamps and shoals and consequent desiccation to some extent. Even now salt-wastes and scrub-jungle can be seen stretching over a hundred square miles or more in Bhal. In protohistoric times the recurring floods in the rivers determined the nature of constructions made and the building materials used. The main problem was one of protecting the houses from inundation. Initially, Lothal had to be enclosed by a peripheral mud-bund. Soon, experience showed that more durable anti-flood measures were necessary to protect the town from floods. Hence massive platforms of mud-bricks and mud were built to raise the general occupation level. The construction and maintenance of public works such as the dock, drains, warehouse, peripheral walls and platforms could not have been possible but for the co-operation of the inhabitants who worked under the direction of an able leader. More will be said about the administration of the town later on (below p. 102). The sheetflooding of the low-lying area in which Lothal was situated must have necessitated construction of irrigation works such as dams and canals. All vestiges of irrigation works appear to have been buried under thick deposits of flood. However, one canal used for navigation purposes has been traced.

The knowledge of engineering possessed by the Harappans was far superior to that of their contemporaries elsewhere, a fact borne out by the meticulous care taken in building dock, public and private drains and other buildings.

A. Building Material

(i) *Brick*

The Lothal folk did not use kiln-fired bricks for building houses and platforms. They used mostly sun-dried bricks for this purpose. The scarcity of wood appears to be the reason. As the climate has not changed much since three thousand years it may be presumed that the rainfall was not very heavy and there was no need of kiln-fired bricks except for building baths, drains and dock which had to be impervious to water. Two types of mud-bricks are easily distinguishable at Lothal. Bricks made of buffish alluvial clay without any kankar nodules used in phases I to III are found to be much stronger than those made of blackish clay used in phases IV and V. The most common size is $11 \times 5\frac{1}{2} \times 2\frac{1}{2}$ in. but some vary from $12 \times 6 \times 3$ in. and $14 \times 7 \times 3$ in. to $15 \times 8 \times 3\frac{1}{2}$ in.

Besides the kiln-fired bricks were well moulded and fired common size $11 \times 5\frac{1}{2} \times 2\frac{1}{2}$ in. a smaller size measures $9\frac{3}{4} \times 5 \times 2\frac{1}{4}$ in. Radial bricks used in the construction of the wells and at the curves of drains are $9\frac{1}{2}$ in. long, $3\frac{1}{4}$ in. thick, and $4\frac{1}{2}$ in. wide at one end and $3\frac{1}{2}$ in. at another (pl. XXVA). Small bricks measuring $3 \times 2 \times 1$ in. and T-shaped bricks were also used in the openings of the drains (pl. XXVB). A remarkable feature of the masonry of the Harappan sites is the standardization of the size of bricks namely $11 \times 5\frac{1}{2} \times 2\frac{1}{2}$ in. for most of the constructions throughout the vast area covered by the Harappan Civilization. Another noteworthy feature of standardization is the maintenance of a suitable proportion between the length and breadth of the bricks. Whether sun-dried or kiln-fired, the bricks measure 1 length: 2 breadths e.g. $11 \times 5\frac{1}{2}$ in. in the case of baked bricks. Apparently, the Harappans must have realized the necessity of maintaining the said proportions with a view to use complete bricks as headers or stretchers in achieving the required thickness of the walls. If the most common size of the mud-brick is compared with the most common size of the baked-brick the difference is within the limits of the permissible fire-shrinkage, namely 8 to 15 percent. This difference further suggests that the moulds were of common size for mud-bricks as well as the burnt ones. Thus it is obvious that the bricks were burnt not only to modern standards but also on modern principles. They have sharp right-angled edges and the sides are parallel.

(ii) *Stone*

The total absence of stone anywhere within fifty miles from Lothal forced the Lothal folk to substitute baked clay for stone. Thus terracotta balls and cakes came to be used as sling-balls and net-weights and occasionally for floors also. At Kalibangan terracotta balls are found to have been used as road metal. Stone was sparingly used for door-sockets etc. in important buildings and in making tools and weapons, but not for building purposes. In one case a block of miliolite was found embedded in the brick-paved floor of a bath, while another block was used for closing the mouth of a soakage jar skirted with bricks (pl. XXVI A). Occasionally stone blocks were used for ritualistic purposes also.

(iii) *Wood*

Although swamps and salt-charged land did not permit growth of thick forests, *tamarix* and *acacia* were available for making door-leaves, beams, rafters etc. For ship-building and furniture-making the Lothal folk appear to have imported timber from outside Kathiawar. Teak might have come from the forests of Sabarkantha. For non-building purposes certain superior varieties of wood such as *Pterocarpus santalinus* (*Lalchandan* or redsanders) used by Rangpur folk and the *Melias* used at Lothal must have come from Malabar. A highly decomposed wooden beam, 8 ft. in length, used in the construction of a house in phase IV has been traced at Lothal, but the species is not

identified. Wooden channels are found to have been used in a weep-hole of the spill-way of the dock (pl. XXVIB), while at Kalibangan they served the purpose of drains.[1]

(iv) *Mortar*

Generally mud-mortar was used as binding material in constructing residential buildings, the use of lime-mortar being limited to the construction of drains, baths, water chutes etc. Floors paved with baked-bricks were occasionally lime-plastered. In important buildings even the mud-brick floor was lime-plastered (pl. XXVIIA). In the case of the walls of the dock, mud, mixed with lime, has been freely used. The analysis of the mortar has shown that ordinary calcareous clay containing sand and silt was mixed with chaff for plastering walls (pl. XXVIIIA). There is no trace of gypsum mortar at Lothal, but it was used at Mohenjo-daro.

B. Mason's Tools

(i) *Plumb-bob*

Among the tools used by the masons the terracotta plumb-bob, an angle-measuring instrument of shell and an ivory scale, all found in the excavation, deserve mention. Two types of terracotta plumb-bobs have been found at Lothal. One of them has a vertical hole for suspension by passing a string through it (fig. 102, 1-2). The second type is suspended from a string passing through a hirozontal perforation in the knob at the top. A perforated terracotta cylinder was placed over the knob as shown in pl. CCXVA.

(ii) *Compass*

A hollow cylindrical object of shell having eight slits, four in the upper margin and four in the lower, served the purpose of a modern cross-staff. The instrument can be used for producing angles of 45°, 90°, 180° and so on upto 360°. The straight lines obtained by joining the pinpoints seen through opposite slits cut one another at 45°. The practical use of this instrument as a compass is demonstrated in pl. CCLXXIXB. Without the aid of such scientific instruments it would not have been possible for the masons and architects to determine the alignments of streets, houses and drains accurately.

(iii) *Scale* (Pl. CCXCIVB)

The masons must have used scales to measure the length. Fortunately one such scale made of ivory measuring 5 × 0.6 in. found in the excavation is marked with 27 lines

[1] *Indian Archaeology* (1961-62), pl. LXIVB.

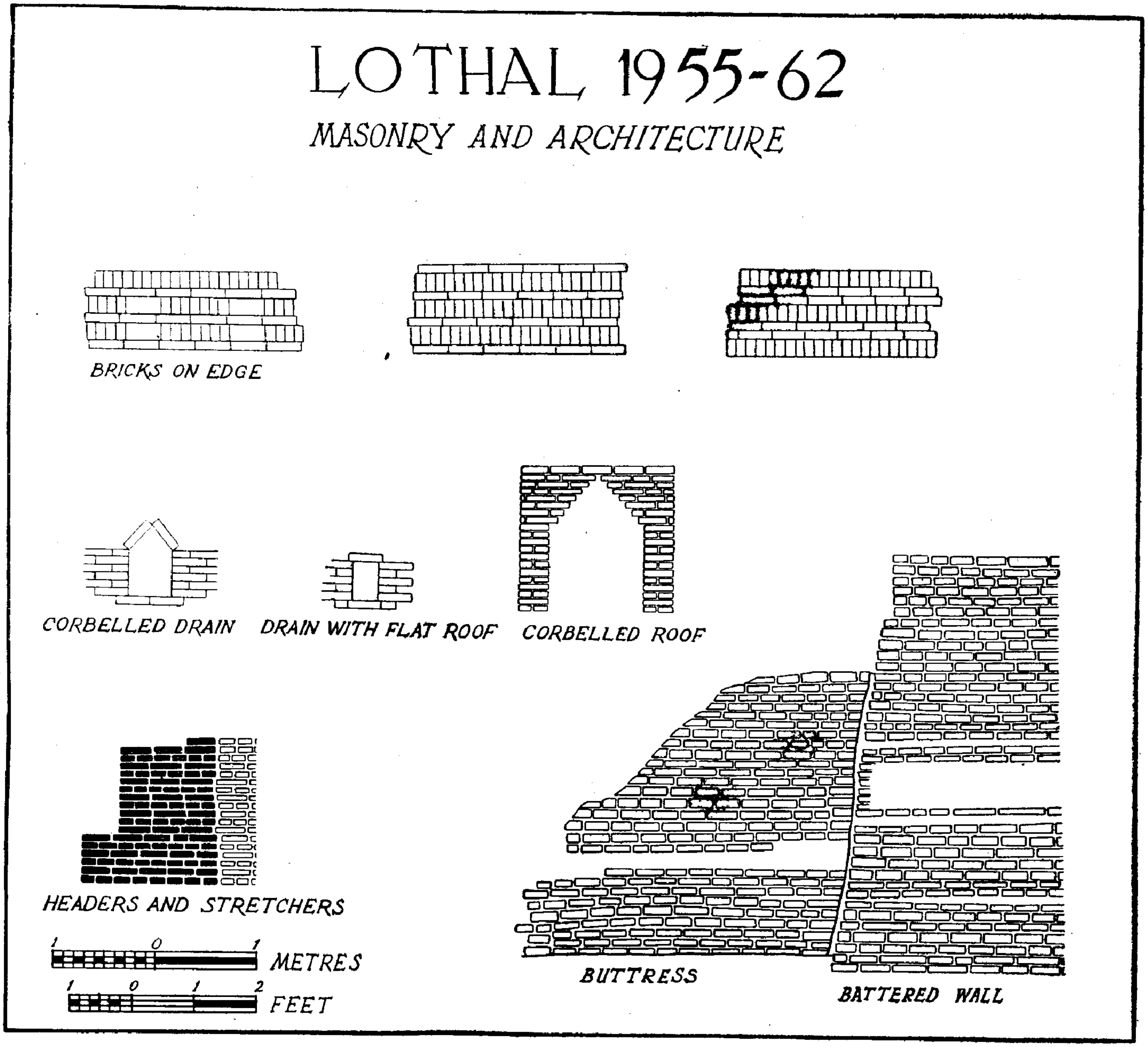


Fig 8.

covering a distance of 1·81 in. giving an average of 0·0689 (0·07) in. per division. Twenty such divisions approximate to the distance between two circles marked on the Mohenjo-daro scale of shell. The distance between the five divisions in the Mohenjo-daro scale is 1·32 in. which is almost equal to the distance between 20 divisions 1·338 (1·34) in. on the Lothal scale. Ten divisions on the Mohenjo-daro scale give 2·64 ins. which apears to be the unit in the Indus valley. Raju and Mainkar[1] have taken the length of the

[1] L. Raju and V. B. Mainkar 'Development of Length and Area measures in South India—Part I' *Metric measures* (New Delhi 1964), vol, 7, no. 1, pp. 4-5.

basic recurring unit in use at Mohenjo-daro as 2·64 in. It is interesting to note that the first ten divisions on the Lothal scale give a distance of 0.689 in., and if mean error is added, the distance measured is 0·699 (0·7) in. This unit of 0·7 in. is almost equal to the *angula* of *Arthasastra.* Raju and Mainkar have also evaluated the *angula* at 0·7 in. Thus the Lothal scale may be said to be nearer the traditional metrology of India than the Mohenjo-daro scale. Secondly, because of the smaller divisions the Lothal scale was more useful in measuring small lengths of the seals etc. It is not certain whether Lothal artisans followed one linear measure for seals and another for measuring buildings etc.

C. Masonry and Architecture (fig. 8)

Unlike in Mohenjo-daro and Harappa where the walls of the house were batterred, the walls built at Lothal were in plumb on the interior as well as exterior except in the case of the platform of Block 'B' which is however found to be slightly battered to an angle of 2° (pl. XXVIIIB). The masons have, as far as possible, tried to use complete bricks lengthwise or breadthwise in the form of headers or stretchers or both in the same course to attain the required thickness of the wall. The following variations in the use of bricks as headers and stretchers in a single course have been noted.

(a)	Drains	Baked-brick walls.	(i) One stretcher (ii) One header
(b)	Houses	Mud-brick walls	(i) One stretcher (ii) Two stretchers (iii) One header (iv) Two headers (v) Four headers (vi) One stretcher between two headers. (vii) One header between two stretchers. (viii) Three headers and a stretcher. (ix) Two stretchers between two headers. (x) One stretcher between two headers on One side and one header on the other.
(c)	Dock	Baked-brick wall	Four stretchers or three stretchers between two headers, or two headers and two stretchers used alternately.
(d)	Revetment of the peripheral wall	-do-	-do-

Alternate header and stretcher courses have been used in most cases (fig. 8) to break the verticality of the joints and to obtain the necessary strength for walls. The binding

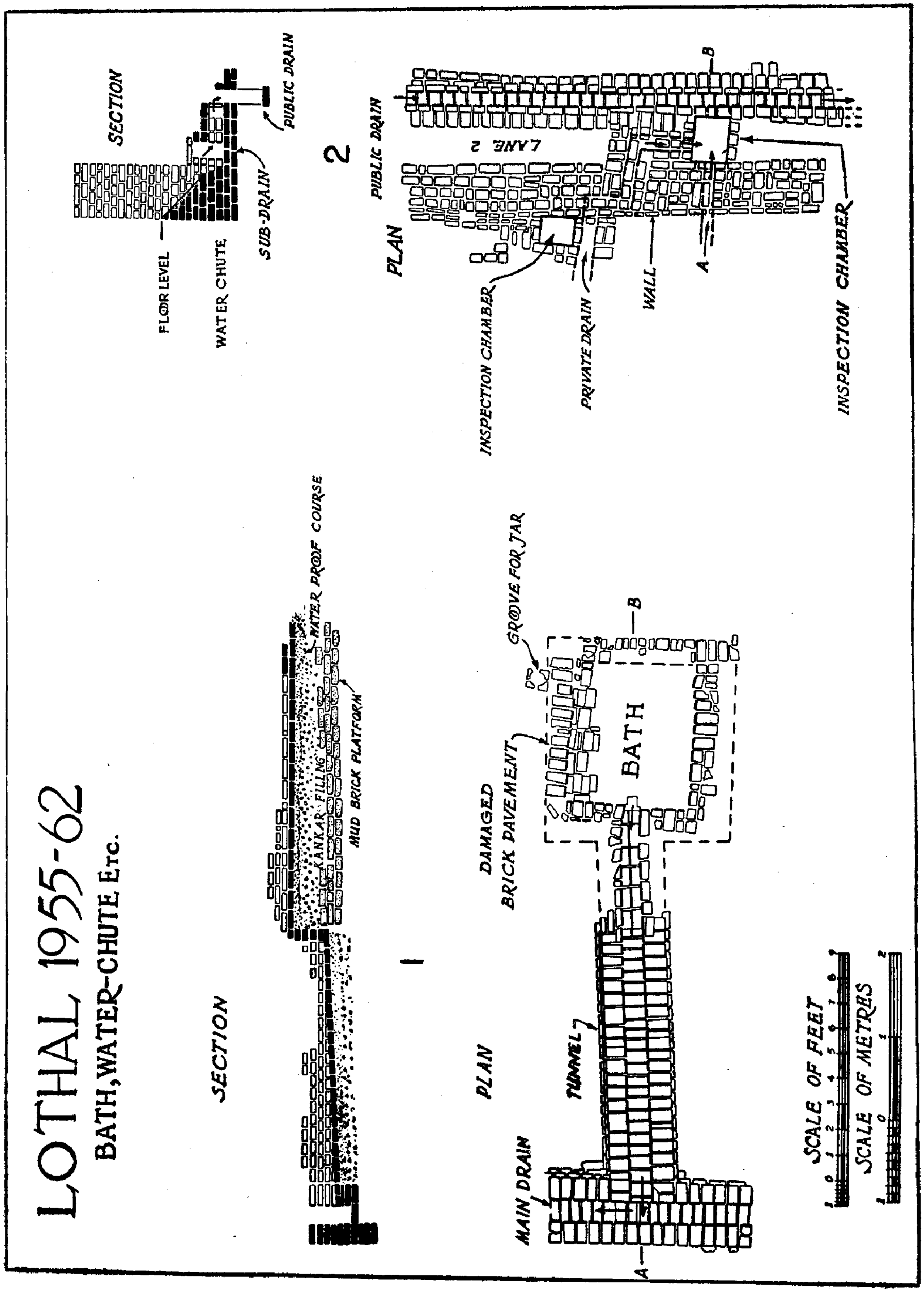

LOTHAL 1955-62
BATH, WATER-CHUTE Etc.
SECTION
KANKAR FILLING
MUD BRICK PLATFORM
WATER PROOF COURSE
1
PLAN
MAIN DRAIN
TUNNEL
DAMAGED BRICK PAVEMENT
GROOVE FOR JAR
BATH
A
B
SCALE OF FEET
SCALE OF METRES
SECTION
FLOOR LEVEL
WATER CHUTE
SUB-DRAIN
PUBLIC DRAIN
2
PLAN
PUBLIC DRAIN
LANE 2
INSPECTION CHAMBER
PRIVATE DRAIN
WALL
INSPECTION CHAMBER

FIG. 9

adopted by the Harappans more than 4000 years ago was identical with the so-called English bond of modern masonry. The thickness of baked-brick walls varies from 11 ins. to 34 ins, which in terms of Lothal units are 16 to 51. Whenever bricks removed from earlier walls were reused it was not always possible to lay them in alternate courses of headers and stretchers as was otherwise the custom. Sometimes insertion of a stretcher or a header here and there was found necessary to break the vertical joints. Footings are rarely noticed in the walls as most of them stood on substantial platforms. But particular care was taken in the case of the embankment walls of the dock to provide one or more offesets, the bottom-most being 4 to 6 in. wide. A baked-brick wall, 28 in. thick running east-west in Block 'B' has also a small footing. Whenever a new wall was built on an earlier one the latter was levelled up uniformly before raising the new one. In addition to the trabeated arch noticed in the spillway (pl. XXVIIB) the vaulted roof also appears to have been attempted at Lothal in the case of a kiln in Block B.

(i) *Baths and drains* (fig. 9)

The high sense of sanitation which the Harappans had developed is demonstrated by the provision of a bath in every dwelling house at Lothal. It appears that some houses had more than one bath or ablution pavement. Of all the sectors of the town the Acropolis was best served with baths and drains. A row of twelve baths, each separately connected by a runnel with the public drain (pl. XXXA), can be seen in Street 2. Whatever may have been the religious beliefs of the Lothal people one thing is obvious, and that is, bathing was a great necessity and probably an important ritual also. All the baths were originally paved with polished bricks and plastered with lime. In one of the baths where remnants of brick-paved floors are still visible such bricks can be seen. The bricks were rubbed down (pl. XXIXA) to produce fine joints and thus render the masonry watertight. Sometimes, it became necessary to raise the floor-level by adding a few courses of bricks whenever there was subsidence due to flood. The floor was invariably 'wainscotted' or skirted with bricks laid-on-edge or flat and the height of the skirting wall was not more than 9 in. Generally the size of the bath was larger in the Acropolis than in the Lower Town. Most of the houses in Street 2 had baths measuring 8×6 ft. and some 6½×6 ft., while those in Block 'A' measured 4 ft. 6 in. × 3 ft. 3 in. and 3×3 ft. It is interesting to find that the Lothal gentry had more spacious baths than those in the citadel area of Mohenjo-daro and Harappa. Most of the baths in Mohenjo-daro measure 4 ft. 6 in. × 3 ft. 3 in but a few measured 8'1 in. × 6'5 in. The pavement was gently sloped towards the outlet. Five brick-skirted pavements (pl. LIVB) of phase V built at the north-end of Block 'A' are inter-connected with runnels. They are however too small to be used as ablution pavements, and the half-jars containing ash embedded closeby suggest that the pavements were used by coppersmiths for cooling the hot metal. The internal measurements of the pavements vary from 8 × 6 ft. to 6 × 6 ft.

The waste water from the private baths of the Lower Town flowed into small brick-lined sumps or soakage jars through runnels. These jars had a hole in the base to allow

liquid waste to soak into the ground while the solid matter was regularly cleared to prevent overflowing of waste water into the streets. The entire Acropolis and a major part of the Lower Town were provided with an excellent drainage system in phases II and III. Even small lanes were served with underground brick-built drains.

Masons have shown their maximum skill in building drains, sumps, inspection chambers, water-chutes and cess-pools. The internal width of the main sewers varies from 4 ft. to 2 ft. 1½ in., while the house drains are 9 in. to 3½ in. wide. The drop is found to be 1 ft. 2 in. over a length of 115 ft. in the case of the public drain 15c, while the continuation drain 15a has a drop of 3 ft. 2 in. over a length of 106 ft., thus clearly providing a steeper gradient at the end to ensure self-clearance. Where the drain took a turn at an angle as in the case of the drain 15a, the curve was smooth enough to minimise friction. The terminals of the runnels were kept sufficiently high above the floor of the public drain to prevent the back-flow of water (pl. XXXA). It is interesting to find that the main drain (15a) running northwards in the Acropolis has nine drops within a distance of 42 ft. in the lower part, which accounts for a fall of 2·1 ft. out of the total fall of 3·15 ft. The floor is paved with polished bricks and the joints are almost hair-breadth. Another unique feature of this drain is that it slopes towards both margins of the floor and the central third is flat, to ensure provision of two smaller marginal channels for easy flow. One of the reasons for building the floor flat between the drops was to change the angle of flow. This made smooth flowing possible when the gradient was steep. The shallow rectangular holes seen in the walls on either side of the drops (fig. 11) suggest that wooden battens were used for laying bricks in proper level. In the floor of the sewer (29) built in the southern half of the Acropolis there is a smaller drain to carry the normal flow of water as in modern sewers of large cities. The northern drain increases in depth from 2 ft. to 5 ft. Thus it is obvious that the drains were designed to carry sewage disposal as well as storm water. Smaller drains namely No. 28 and part of 15c were covered with loose bricks about 6 in. below the ground level so that they could be lifted easily for inspection and cleaning the channel below.

(ii) *Cess-pools*

Both the main drains in the Acropolis (15a and 29) emptied themselves into cess-pools built at the foot of the mud-brick platforms. The cess-pool receiving sullage water from the northerly drain (15a) is 4¼ × 4¼ ft. and about 5 ft. deep (pl. XXXIA). The vertical grooves at the mouth of the drain were meant to insert a screen or door so as to stop the flow of solid waste into the cess pool. This arrangement also helped in cleaning the cess-pool. The brick veneering provided as an apron to the platform below the drain is found to be stepped in the case of the southern cess-pool (pl. XXXB) to permit smooth flow of water and prevent erosion of the mud-brick platform. Provision of screens at the mouths of the drain to collect all solid waste matter was a further improvement over the drainage system then existing at Mohenjo-daro.

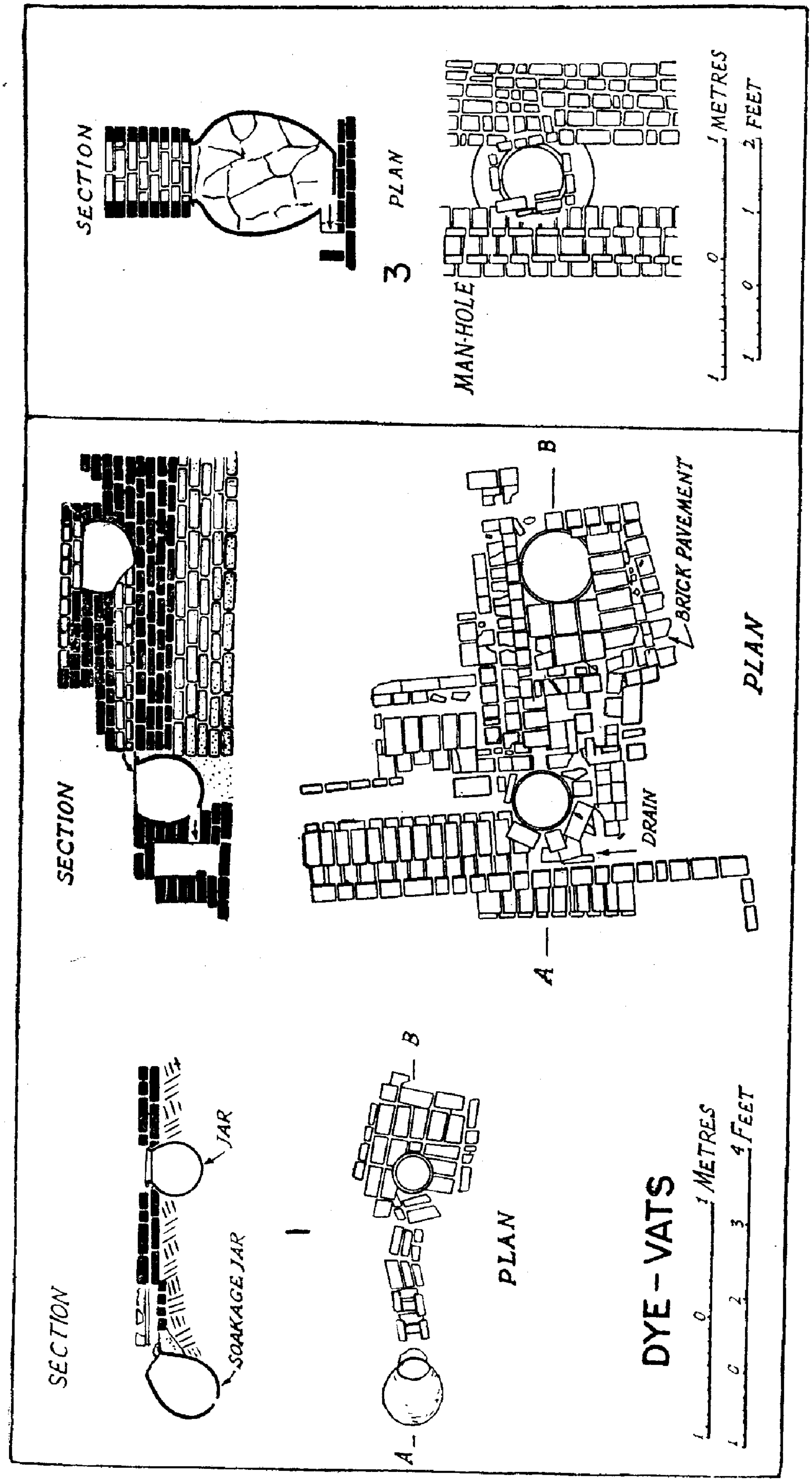

DYE - VATS
1
SECTION
SOAKAGE JAR
JAR
PLAN
A
B
METRES
FEET
SECTION
PLAN
DRAIN
BRICK PAVEMENT
3
SECTION
PLAN
MAN-HOLE
METRES
FEET

FIG 10.

(iii) *Water-chute*

A water-chute 6 × 4 in. in section was built into a 2 ft. thick wall of a house when the floor was raised to a height of 3 ft. 6 in. above the level of the drain (15c) in phase III (fig. 9, pl, XXXI B). In Mohenjo-daro water chutes were built into the walls to discharge rain and sullage water from the upper storey of a terrace, but in Lothal no evidence of a two-storeyed building is available.

(iv) *Man-hole*

An important contribution made by Lothal to sanitary engineering is the construction of a man-hole. A burnt-brick enclosure, 2 ft. 6 in. square and 3 ft. high, was built over a large jar, 2 ft. 4 in. in diameter, in lane 3 of Block 'B' (fig. 10, pl. XXXIIA) in phase III, when the general road level was raised. There is a hole in the bottom of the jar to allow sullage water to enter the drain of phase IIa (15a), which must have been recommissioned for use in phase III. The top of the brick work over the jar is in level with the road of phase III and about 1 ft. below the floor of brick-bat floor of a house assigned to the same phase. The man-hole is wide enough for a man to get into it.

(v) *Soakage jars*

Soakage jars were embedded in the streets close to the mouths of the runnels connecting the bath or kitchen of a house in the Lower Town. Some of the jars are very large in size, the diameter being as much as 2 ft. 3. in. At times, when the jar sank due to erosion another jar was placed above it (pl. XXXIIB). To ensure that no damage was caused by flow of water to mud brick platforms over which the runnels passed, a veneer of kiln-fired bricks and a waterchute were provided in many cases (pl. XLIA). The soakage jars had a hole in the bottom to allow liquid waste to soak into the ground. Frequently they were skirted with bricks to prevent splashing.

(vi) *Inspection chambers*

The high sense of public sanitation exhibited by the residents of the Acropolis is astonishing. They provided one or more sumps of baked bricks to act as inspection chambers connecting the runnels with the private bath on the one hand and the public drain on the other (fig. 9, pl. XXXIIIA). Solid waste matter which settled down in the sumps was periodically removed allowing only sullage water to enter into the drains. This device prevented the choking of drains. Two instances of baths (60 and 66) of phase IIb, each provided with two inspection chambers, have come to notice. Sometimes soakage jars also served the same purpose as inspection chambers did, for example, in house 114 of phase IIIa.

From a careful study of the constructions of baths, drains, manholes, soakage jars, sumps, waterchutes, cess-pools and main sewers it becomes abundantly clear that Lothal

had a well planned underground drainage system which could effectively carry the monsoon water besides the domestic sewage. The entire waste water was left into the dock on the east, the river on the southeast and the nullah on the north. The solid matter was screened off in the brick-built sewers before entering the cess-pools. The architectural and functional aspects of the Lothal drains are similar to those of the sewers in modern cities. They could rapidly remove all waste matter without allowing any foul gases into the buildings. There were many devices for quick cleaning and periodical inspection.

(vii) *Privy*

The houses in Mohenjo-daro are said to have been provided with privies. A solitary example of a house with a privy is left in the Acropolis at Lothal. In this case a jar is embedded in a pavement of brick-bats and terracotta balls skirted by sloping bricks (pl. XXXIIIB), and its mouth is covered with a stone (pl. XLIV). The drain, if any, appears to have been washed away.

(viii) *Dye-vats*

Two jars interconnected with a small drain are found embedded at two different levels at the eastern end of drain 15c (fig. 10, pl. XXXIVA). The upper one is embedded in a rectangular brick pavement skirted by bricks which are laid flat. The lower jar, also skirted by bricks along the rim, received water overflowing the upper jar through a covered drain. Neither of the two could have served as a soakage jar as there is no hole in the bottom of either. On the other hand, the water overflowing the lower one entered the public drain 15c. It is thus obvious that the pavement and jars could not have served as an ablution pavement or as a privy. One possible explanation is that the jars served as dye-vats. Similar dye-vats are still in use at Bombay and Ahmadabad.

Another dye-vat (17c) of this type assignable to phase IVa is seen at the eastern end of a mud-brick platform built on the debris of phases II and III overlying the drain (28).

(ix) *Staircase* (pl. XXXIVB)

The only staircase found at Lothal in SRG 2, AX i, has been greatly damaged. At present it is 2 ft. wide, with treads 9 in. broad and 6 in. high. Baked and unbaked bricks measuring 11 × 5 in. are laid on edge alternately in each tread. Originally the staircase must have been wider. Whereas at Mohenjo-daro the treads were either too high or too low, they are found to be normal in height and breadth at Lothal as in the case of modern stairways suggesting an improvement over Mohenjo-daro in domestic architecture.

(x) *Doorways*

A sandstone slab with a circular depression found near a mud-brick house served the purpose of a door-socket (pl. XXXVA). The doorways varied from 3 to 4 ft. in width, of the bazaar street is rectangular on plan. Its walls are formed by burnt-bricks laid vertically on end (pl. XXVIIB). A stone-anvil bearing marks of use, a terracotta crucible

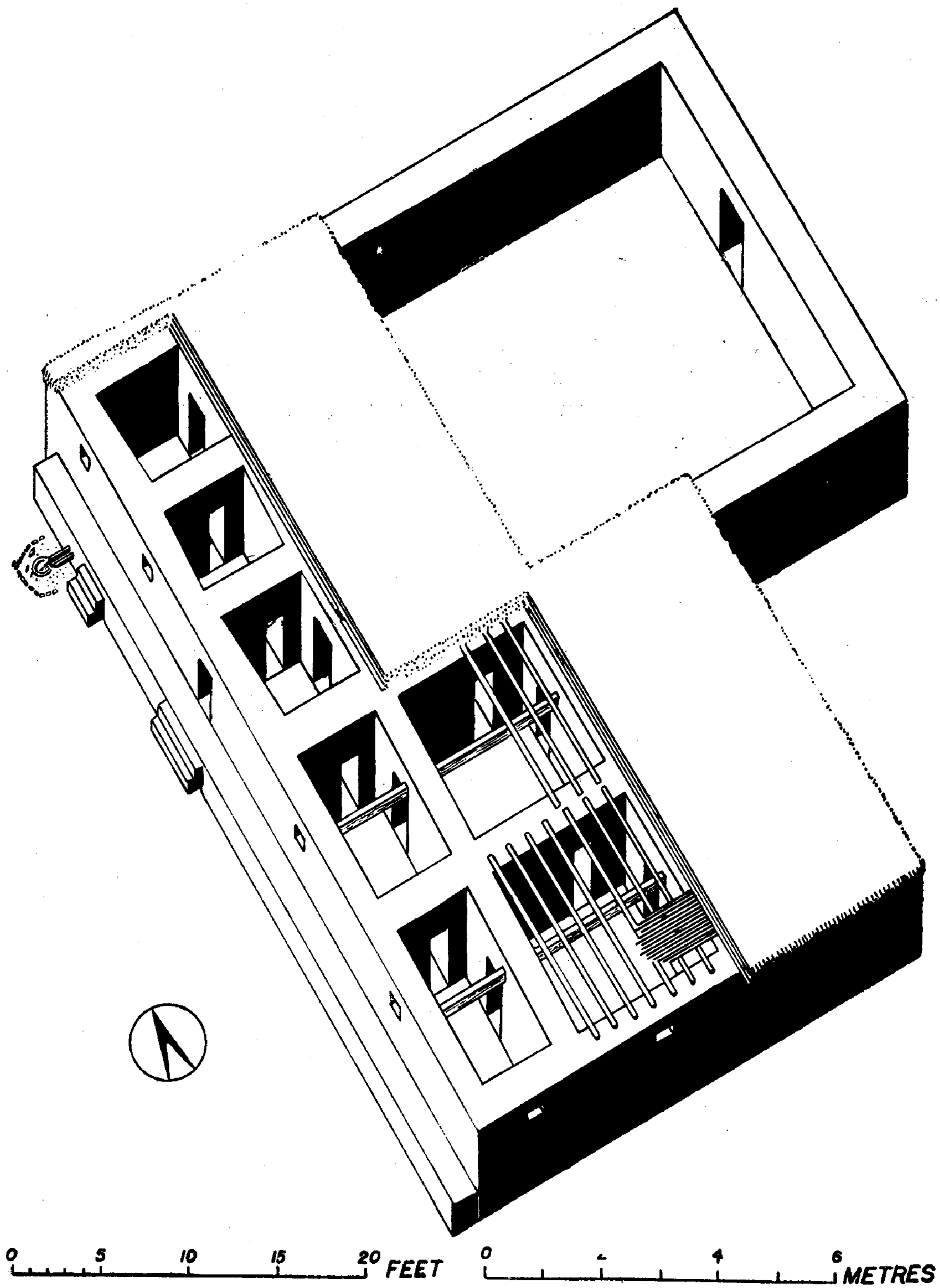


FIG. 11.

Isometric view of a merchant's house (reconstructed); Lower Town

but normally in multiples of the unit of linear measurement namely 7·2 inches on the Lothal scale. Sometimes rooms had only three walls, the fourth side being completely open. In a few cases however the doorway could not be traced at all. The small size of rooms suggests that the weight of the roof could be borne only when walls were close to each other as in flat roofed houses. Hence it is presumed that roofs in Lothal were not different from those in Mohenjo-daro. Further evidence of flat roof can be had from the impressions of wooden beams and purlins on the undersurface of large chunks of rammed clay found burnt in the warehouse when it caught fire.

(xi) *Floors*

The floors in the houses were invariably paved with mud-bricks and covered with mud-plaster. In one instance the floor is found to have been plastered with lime (pl. XXVII A). Two mud-brick houses of phase III in Block 'E' had their floors made up of ovoid terracotta balls and triangular cakes and plastered with mud (pl. LXXXVI A). Cinders from pottery kilns and powdered brick *(surkhi)* were used for a damp-proof course in the construction of the floors of baths and drains (pls. XXXVC and XXXVIA). The thickness of the damp-proof course varies from 1 to 3 inches. All places subject to continuous flow of water were paved with burnt bricks.

(xii) *Kilns and furnaces* (fig. 12)

Two kilns have been noticed at Lothal. One of them situated close to the bead factory in Block 'F' is circular on plan and has two chambers (fig. 11; pl. XXXVIB), one above the other. Its longer axis along the mouth which was meant for supply of fuel is 8 ft. 6 in. Fire reached the upper chamber through four flues all of which are interconnected. The brick-walls and floors of both the chambers are mud-plastered, but the walls are too dwarf and thin to support a vaulted roof, and the kiln itself is too small to serve as a pottery kiln. There is sufficient evidence to show that this unique type of kiln was used for baking pebble and beads of semiprecious stones. Among the important finds from the kiln are beads in different stages of manufacture, partly-baked pebbles, fragments of earthen bowls used as containers for baking the pebbles and finished beads. Owing to intense heat the mud-plaster on the walls has turned red and the bricks are vitrified. Baking was resorted to at two stages, first for facilitating removal of the cortex of the pebbles and next for obtaining a red glow on finished beads. It is interesting to note that the present-day lapidaries of Cambay follow almost the same process as the one followed by the Lothal folk more than four thousand years ago.

Two types of furnaces used by coppersmiths are laid bare in Block 'A'. One of them assignable to phase III is more or less a circle on plan with a rectangular projection for supply of fuel (pl. XXXVIIA). The enclosure wall has been heavily damaged leaving only some traces of the mouth at one end which might have been used for introducing pots containing metal. A thick bowl of coarse grey fabric with traces of copper and fragments of a copper chisel and a rod were found here. The second furnace laid bare in house no. 154

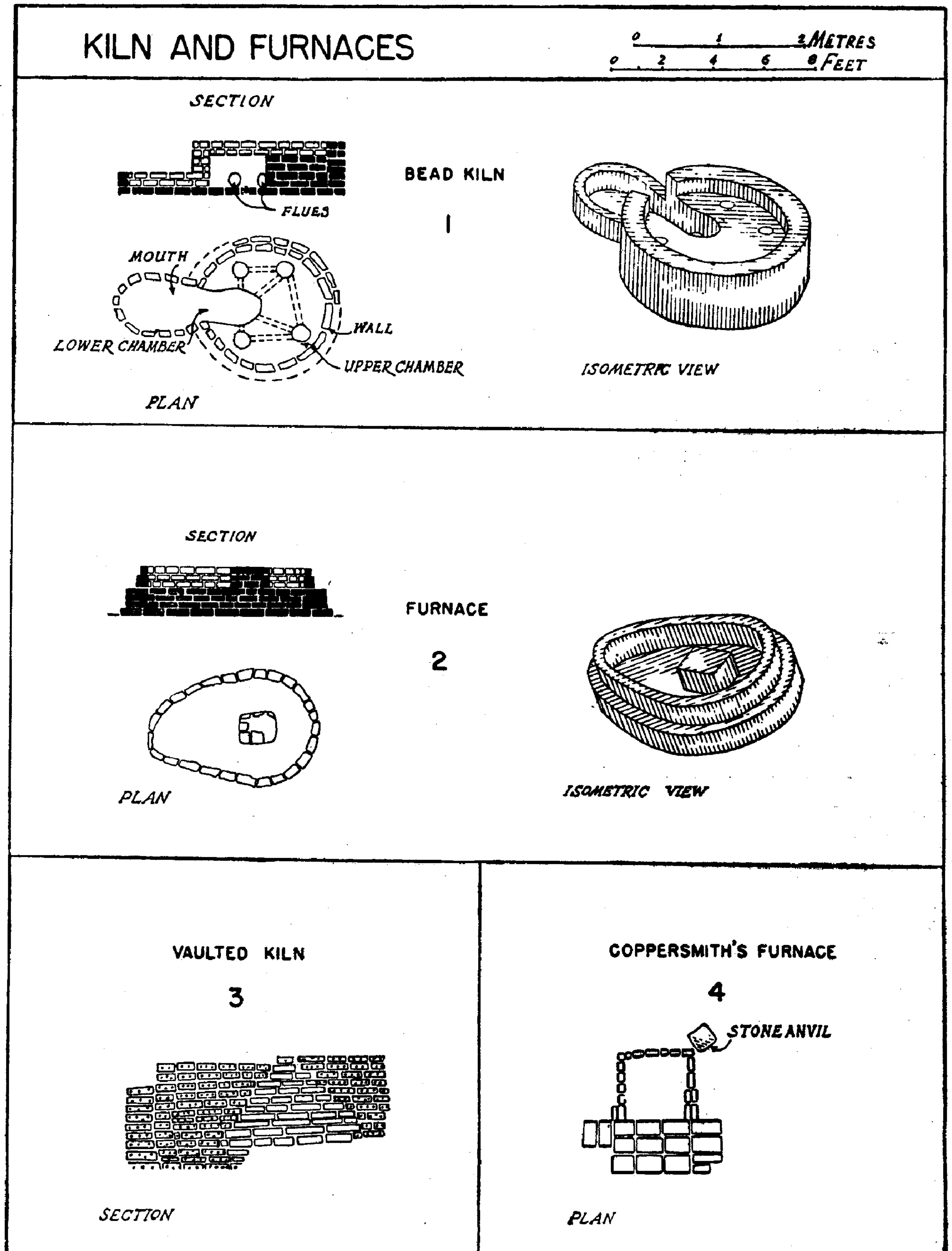

KILN AND FURNACES
0 1 2 METRES
0 2 4 6 8 FEET
SECTION
FLUES
BEAD KILN
1
MOUTH
WALL
LOWER CHAMBER
UPPER CHAMBER
PLAN
ISOMETRIC VIEW
SECTION
FURNACE
2
PLAN
ISOMETRIC VIEW
VAULTED KILN
3
SECTION
COPPERSMITH'S FURNACE
4
STONE ANVIL
PLAN

FIG. 12

a muffle and a copper pin found near the structure go to prove that the structure was used as furnace by a coppersmith. In both the cases the crucibles were placed directly on burning coal in the enclosure as is done even today. The first type had a vaulted roof and the copper ingots were introduced in pots through the hole at the bottom of the furnace must have been covered with charcoal or burning dung-cakes. When the ingots melted they were taken out and cast to required size and shape.

2. TOWN PLANNING (pl. XXXVIII)

A. General

The most important feature of the Harappa Civilization is the systematic planning of the town, which is noticeable at Lothal also in phase II. Earlier however the inhabitants lived in a village standing over a low natural tell protected against flood by a mud-bund, 52 ft. wide at the base and 42 ft. at the top. The alignment of street and details of planning in phase I are not known partly owing to the total destruction of houses of mud and mud-brick and partly due to limited excavations. The dwellings must have been concentrated in the southern half of the mound covering an area of 30,000 sq. ft., for, very little occupation debris of phase I is seen at the northern end. Kiln-fired brick was scarcely used for building houses in this phase. Long before the destruction of the village by a flood in circa 2350 B C. the Harappans had settled down here and could not do much by way of planning. But the devastation caused by floods was a challenge to their intelligence, which they met by building a well-planned town with a grand array of blocks of houses raised on massive platforms of mud-bricks. They also reinforced and amplified the mud-bund, as a further safety measure against flood. The town roughly forms a rectangle measuring 1800 ft. from north to south and 1200 ft. from east to west. Some remnants of a brick-structure uncovered at a distance of 1000 ft. south of the southern peripheral wall and the scatter of pottery and bricks found about 1500 ft. south-east of the dock suggest that the town extended far beyond the limits of the present-day mound. It must have been more than a mile and a half in circuit.

Lothal was rigorously planned in several rectangular blocks, of which seven have been traced so far. These blocks varying in size from 375 × 75 ft to 160 × 135 ft. were devided from one another by side streets and systematically laid-out lines. The houses were built on 4 to 12 ft. high platforms in straight rows on either side of streets and lanes, along the margins of which ran underground public drains. The arterial streets divided the town into several grids in a chess-board pattern, while the network of lanes running parallel and at right angles to the main streets provided the necessary access to every house (below p. 87). The drainage system of Lothal was efficient, sophisticated and in some respects superior to that of Mohenjo-daro. Underground drains, waterchutes, soakage jars and cess-pools were planned to drain off sullage and storm water. A complicated system of surface and underground drains was so built and the lanes were so laid out as to take advantage of the natural flow of air-currents for purposes of ventilation. The entire town was protected from floods by a peripheral wall of mud-bricks and mud. The essential features of modern town-

planning are noticeable in Lothal town. The streets connecting the various blocks run straight and are oriented to the points of the compass. The major factories such as the bead-factory and simthy were situated slightly away from the main habitation area. The bazaar was centrally situated with streets connecting all the blocks. The streets were broad, the broadest being 40 ft. allowing ample room for vehicular traffic. The narrowest lane was 12 ft. wide. The initial lay-out and plans of blocks and houses were meticulously maintained in successive phases of reconstruction of the town. There was hardly any overcrowding of houses, for, the large rooms and courtyards were rarely subdivided in subsequent reconstruction. The spacious houses of the Acropolis and the Lower Town suggest that a large section of the population was quite prosperous in phases II and III.

Although the Acropolis dominated the town it is the dock and the warehouse which stood close to the Acropolis that played a vital role. The planners took care to see that the ships could enter the dock from the river flowing on the western margin through a nullah running along the northern edge of the town. The cemetery was deliberately kept out of the town but near the water source.

The arterial streets run in cardinal directions dividing the Acropolis and Lower Town into several grids. Street 1 running east-west through the bazaar in Block 'A' forms the central divide. Street 5 which runs parallel to street 1 on the west connects the Acropolis with the Lower Town. Street 6 running north-south meets Streets 1 and 5 near the northern arm of the Acropolis which itself is gridded by Streets 2, 3 and 4 and further intersected by several lanes. The Lower Town extending west of the Acropolis is served by Streets 7 and 8 which meet Street 5 almost at right angles. The cemetery is connected with the Lower Town by Street 9.

Seven blocks laid bare so far have been numbered A to G for convenience. Block 'A' which lies north of the Acropolis forms the central part of the Lower Town.

The Acropolis which occupies the southern portion of the town is trapezoid on plan measuring 392 ft. on the east and west and 418 ft. and 376 ft. on the north and south respectively. Public and private buildings stood on terraced platforms of mud-bricks and mud, about 12 ft. high, above the then ground level. On the east and south, peripheral mud-brick walls, 86 ft. and 42 ft. wide respectively, were raisedover the mud-bund to protect the Acropolis from floods, while on the west and north, two mud-brick platforms 42 to 60 ft. wide were built. It may be due to deliberate planning that the longer axis of the Acropolis in Lothal lies north-south as in the case of the 'citadels' at Harappa and Mohenjo-daro.

Even while constructing the western and northern arms of the mud-brick platforms of the Acropolis to a height of 12 ft. insecurity seems to have developed necessitating the addition of buttress walls and thereby giving the whole mass a fortress-like appearance. The eastern arm of the perpheral platform which is wider but dwarfer than others served the purpose of a wharf for hauling goods from the ships anchored in the dock. The southern arm is 42 ft. wide and 5 ft. high above the bund. The summit of the Acropolis was easily approachable from the east and south as the slope was gradual towards the dock on the one hand and the fields around the town on the other. The Acropolis was divided into three blocks. The central one, namely Block 'B', was occupied by the ruler of the town and commanded maximum civic amentities. A warehouse was built on the massive platform called

here Block 'C' which is overlooking the dock. It was so planned that the ruler could easily supervise the transactions in the warehouse and also keep an eye on the ships entering and leaving the dock. The peripheral platforms, which had no special features such as salients, towers and bastions nor any carefully guarded gateways, also served the same purpose. The maximum height of the sourthern peripheral wall over which the main public drain runs is not more than 7 ft. high above the ancient working level. It could be easily scaled by the enemy. On the other hand, the houses in the Acropolis stood higher than the peripheral walls. It is therefore obvious that the peripheral walls did not serve as a defensive wall against the invading forces but only as obstructions against sheet-flooding. There is no evidence to show that Lothal was a military cantonment either, for, no barracks were built in the shadow of the Acropolis or anywhere else. By occupying the highest part of the town the ruler and his dependents were safer from floods and commanded more respect and greater comforts of life than other citizens could.

B. Streets and Lanes

There must have been a large network of streets and lanes running in cardinal directions in Lothal town, but so far only nine streets and twelve lanes have been traced (pl. XXXVIII). The most important among them is Street 1 running north-south along the main bazaar in Block 'A' over a distance of 500 ft. It meets Street 6 at right angles near the Acropolis. Street 5 which runs almost parallel to Street 1 is the longest, meeting Street 6 near the north-west corner of the Acropolis and Street 9 near the northern end, both of which run in an east-west direction. Street 5 runs continuously from the northern end of Block 'G' up to the southern peripheral wall of the town after taking two turns half-way. Streets 3 and 4 running almost parallel to one another in an east-west direction in Block 'B' and measuring respectively 10 and 15 ft. wide are interconnected by lanes. All streets except Street 2 are flanked by rows of houses on either side (pl. LVI). As the baths in the Acropolis are built in the rear part of the houses, the main drains run along the margin or in the centre of the lanes, but rarely in the main streets. Drains 28 and 29 however run along Street 2. Soakage jars were embedded at the mouth of the runnel in front of the houses on either margin of the main street or in the lanes of the Lower Town. The strict observance of municipal regulations while reconstructing the houses and in maintaining sanitary conditions speaks highly of the civic sense of the citizens and the great respect they had for authority. Until we come to phase IV no encroachments on the streets are noticeable. Even in phase IV every attempt was made to maintain the original alignment. In spite of the poverty-stricken condition of the people in Period B, it is surprising to find that they made renewed efforts to maintain sanitary conditions to the extent possible by using soakage jars and occasionally building small drains with brick-bats, which indicates that the traditional cleanliness of the Harappans was not forgotten. The squatters of phase V who built mostly mud-houses had neither the resources nor the inclination to plan out streets and lanes.

The streets and lanes in the Acropolis were paved with mud-bricks and covered with a layer of kankar against slush in the rainy season. Even to this day some of the roads in the

towns and those connecting the villages in Gujarat are covered with kankar only. A portion of the bazaar street in the Lower Town is found to have been provided with a soling of broken terracotta balls, while in other places kankar was used for the same purpose.

C. Roof

The roofs of the houses at Harappa and Mohenjo-daro were flat and covered with reeds and mud plaster. Unfortunately no house with the roof intact has survived at Lothal, but the 3 in. thick mud plaster bearing impressions of reeds fallen from the roof of a house in SRG 2, D 13 (pl. XXXV B) gives an idea of the type of house-roofs in Lothal.

3. BLOCK 'A'

Block 'A' measuring 550 ft by 220 ft forms the bazaar part of the Lower Town. It is divided into two major parts by Street 1 flanked by a number of houses. Two separate plans, one showing the structural remains of phases II and III (pl. XL) and the other of phases IV and V (pl. XLIX) are prepared. Other smaller structures such as remnants of a smithy situated at the north-end of the town and the sacrificial altar in the central sector of Block 'A' respectively can be seen in figs. 18 and 19. For purposes of convenience the structural remains are described phasewise.

A. Phase I

Excepting a mud-bund, 42 ft. wide, traced on the northern fringes of Block 'A' no other structural remains assignable to phase I were encountered here.

B. Phase II

The damaged mud-bund was reinforced with kiln-burnt bricks in phase II for the first time.

(i) *Phase IIa*

Block 'A' became the shopping centre of the town in phase IIa and was served by a 22 ft.-wide street flanked by shops. The remnants of a burnt-brick drain traced in the central sector indicate that Lower Town too was served by a drainge system comparable with the one existing in the Acropolis in phase IIA. Later on, however, it is the soakage jars embedded in pits on both the margins of the street that received sullage water from the runnels connecting them with private bathrooms. The alignment of the street is ascertained from the flanking mud-brick platforms of houses. One of the platforms (4), 4 ft. in height, extends from SRG 2, B 37—C 37 to B 23—C 23 serving as a common plinth for the houses built on the eastern margin of the street in the northern sector of the block (pl. XIIIA). Another platform (10) in B 14—B 15 served a similar purpose. But both of

them have been heavily damaged by floods at several places, especially so, at the northern end of the street in D 33—E 33. As the excavation was not carried down to phase II levels in the central part of the block, no houses or platforms of that phase could be laid bare. A mud-brick platform of phase III appears to have been built over a platform of phase II at the northern end of the block which has been heavily damaged beyond SRG 2, B 30. A few remnants of burnt-brick drains, baths and mud-brick floors are the only evidence to show that houses were built on platforms here. One of them is a drain emanating from a house in A 27—B 27. It finds an outlet through a water-chute (4c) built into a mud-brick platform covered with a burnt-brick veneer. Two soakage jars (4d) are placed one over the other in the street below the waterchute (pl. XLIA) to receive sullage water. Unless the occupant of the house was an important person so much care would not have been taken to provide a burnt-brick veneer to the platform against erosion (pl. XLIA). The building of phase III standing to the south of the platform prevented digging down to the natural soil between B 27 and B 25. However, a mud-brick platform (6) of phase II (pl. XIV) built in 7 courses of bricks in C 25 suggests the continuity of the platform on the eastern margin of the street south of the water-chute. The buildings of phases III and IV are superimposed over it. A mud-brick house (7) laid bare in B 23—C 23 is remarkable for the neatly constructed kitchen and bath (pl. XLIIA) each provided with a separate drain. The house stands on a 3 ft. high mud-brick platform covered with a burnt-brick veneer to prevent damage from sullage water discharged by a drain from the kitchen. A soakage jar was placed close to the veneer to receive this water. The floor of the kitchen, 11 ft. square, is made up of brickbats covered with a damp-proof layer of powdered brick and finally plastered with mud. Adjoining the kitchen is a brick-paved ablution-enclosure measuring 4 × 5 ft. and skirted by burntbricks laid on edge. It has also an outlet in the form of a 4 in. wide covered drain which discharged itself into a lane. Another bath was added to this complex in phase IIc. The full plan of the house could not be ascertained owing to the superimposed buildings of later phases on the north and south. On the analogy of the plans of houses of phase III it can be deduced that this house also had a verandah and 3 to 4 rooms in addition to a kitchen and a bath. The occupation level of phase II could not be reached in the grids B 23—C 23 and B 19—C 19, but the existence of houses at both ends of this sector clearly shows that a continuous row of houses stood between B 23 and B 19 also.

A house partially laid bare in B 19 has two rectangular enclosures (pl. XLIB) used as fire-altars. One of them measuring 1 ft. 6 in × 1 ft. is enclosed by mud-brick walls, 5 inches thick and 11 inches high, and its contents are ash. The second enclosure is also rectangular, measuring 2 ft. × 1 ft. 6 in and 5 in. deep, and built into the mud-brick floor. These enclosures which cannot be used as baths, storage bins or ovens seem to have been used for a religious ceremony involving the worship of fire. Similar enclosures of mud-brick, rectangular or circular on plan, and 5 in. to 1 ft. deep, have been found in later houses of phases III and IV in Block 'A'. It is interesting to note that ovoid fire-places with or without an earthen or brick altar in the centre have been reported from Kalibangan.[1]

[1] *Indian Archaeology*—(1960-61) *A Review*, p. 31.

The full plan of the house having two altars mentioned above could not be ascertained owing to the superimposition of later structures of equal importance. A house (94) assignable to phase IIIa superimposed over the earlier house (10) has an altar built for animal sacrifice (fig. 14).

The mud-brick platform (11) laid bare in SRG 2, B 14 and B 15 carries remnants of two mud-brick houses (12 and 13) which are partially uncovered, one each, in B 12 and B 10. The former (12) has a hall and two rooms, in one of which there is a rectangular fire altar provided in the floor. The house (13) in B 10 also consists of a hall and two rooms (pl. XLIIB). The walls vary from to 1 ft. 5 in. to 1 ft. 11 in. in thickness, and the mud-brick floor in which a jar is embedded adjoining a rectangular pit is greatly damaged. A circular enclosure of burnt-bricks, 3 ft. in diameter and 2 ft. deep, appears to be a storage bin.

(ii) *Phase IIb*

Two mud-brick houses, no. 55 and no. 56, each having two rooms, are laid bare in two grids, the former in B 14 and the latter in B 12. They serve as an evidence of the reconstructions made in phase IIb in the Lower Town. Large scale reconstruction by way of raising the floor level of the drains and houses was necessitated by the settlement of the mud-filling in the Acropolis.

(ii) *Phase IIc*

Remnants of a house (81) with three rooms constructed near the northern buttress wall of the Acropolis are traceable in SRG 2, B 8. No other evidence of construction made in phase IIc is available in Block A. The thickness of its long walls is 28 in. and that of the partition wall 5 in. Other constructions made in phase IIc must have been washed away by floods at the end of this phase.

C. Phase III

Undaunted by the destruction caused by flood at the end of phase IIc the inhabitants rebuilt the houses within a short time and even enlarged the township by adding a street leading to the cemetery in phase III. As a sequel to the increased sea-borne trade and expansion of the industries more craftsmen and merchants occupied the Lower Town which extended up to and even beyond the peripheral walls on the south and south-east. The great prosperity of Lothal people during this phase can be judged from the comfortable houses having large verandahs, courtyards and four to five rooms. More seals, weapons, tools and ornaments are found in phase III than in any other phase. Some important structures are described below.

(i) *Phase IIIa*

Remnants of what must have been a very important smithy (143) have been traced in B 37 at the northern tip of Block 'A' near the nullah. The furnace in this case is

ovoid on plan and has a projecting mouth for feeding fuel (pl. XXXVIIA). A terracotta crucible and a heap of slag and cinders were found in the mud enclosure of the furnace which is heavily damaged. A few yards away from the furnace fragments ofbeaten copper were noticed. The stray mud-brick walls and a drain situated closeby suggest the existence of a workshop. The profusion of copper objects in phases III and IV indicates greater activity on the part of coppersmiths.

A bath paved with baked bricks (85) is found built on a mud-brick platform (pl. XLIVB) on the eastern margin of Street 1 in A 34—B 34. It is rectangular on plan measuring 5×6 ft. and is skirted by burnt bricks laid on sides forming a dwarf wall, 5 in. high. An opening in the western wall suggests an outlet. The mud-brick floor of the house to which the bath was attached is also partially traced. Further south is a very interesting structure (144) in which stumps of two burnt-brick pillars, 8 ft. apart, are noticed (pl. XLVA). One of them is 1 ft. 10 in. high with seven courses of bricks and the other is 1 ft. 1 in. high with 4 courses. It is not known whether they are only bases which supported wooden pillars or rose to full height in brick upto the roof. A mud-brick floor and remnants of a drain of burnt-bricks (145) running from east to west are also noticed in this house assignable to phase IIIb. The foundation of the pillars is laid in layer 4, while the mud-brick floor and the drain are laid in layer 3.

A rectangular pit (86b) containing ash and potsherds was used for fire-worship. It is cut into layers 4 and 5 and therefore assigned to phase IIIb.

A drain and a wall of burnt-bricks (88a and 88b) run obliquely on a mud-brick platform (87) in B 32. A mud-brick house with a room, a verandah and a drain built on the same platform in B 30 is partially traced, but it was originally larger in size. The adjoining house (92) has three rooms. The largest building is what is considered to be a merchant's residence (fig. 11). It has a verandah and 3 rooms in the western wing (93), to which another verandah and 2 rooms were added to form its eastern wing (94) (pl. XLVB). Although a complete plan of the building is not available, the extant portion gives us a fairly clear picture of what a middle class house was like. The over-all measurement of the house available is 47 × 23½ ft. extending over the grids B 25, B 26, B 27, C 25, C 26 and C 27. Immediately behind the front verandah of the house are two large and two medium-sized rooms. Four other rooms of smaller size are at the rear. The large rooms measure 8 × 9 ft., the medium ones 10 × 5 ft., and the small one, 6 ft. square. The verandah is 40 ft. wide. A semi-circular enclosure of mud bricks projecting from the plinth into the street contained fragments of a soakage jar, the rim of which was skirted with burnt bricks. A few feet to the north of the soak-pit is a rectangular projection of mud-bricks, one foot high, which was used as a step to reach the house from the street (pl. XLVIA). The identification of the house as that of a merchant engaged in foreign trade is based on ceramic and other evidences. Sherds of 'Reserved Slip Ware' similar to those from the Sargonid levels of Brak (pl. CXXXVII A), two steatite seals and three carnelian beads were recovered from one of the rooms, while another yielded eight gold pendants with axial tubes (pl. CCXCVIB) bearing resemblance to those found in the Royal Cemetery at Ur. Besides these objects a copper bangle and four chert blades were also recovered. The pottery is undoubtedly of foreign origin. Hence the occupant of the house must have been a merchant engaged in foreign

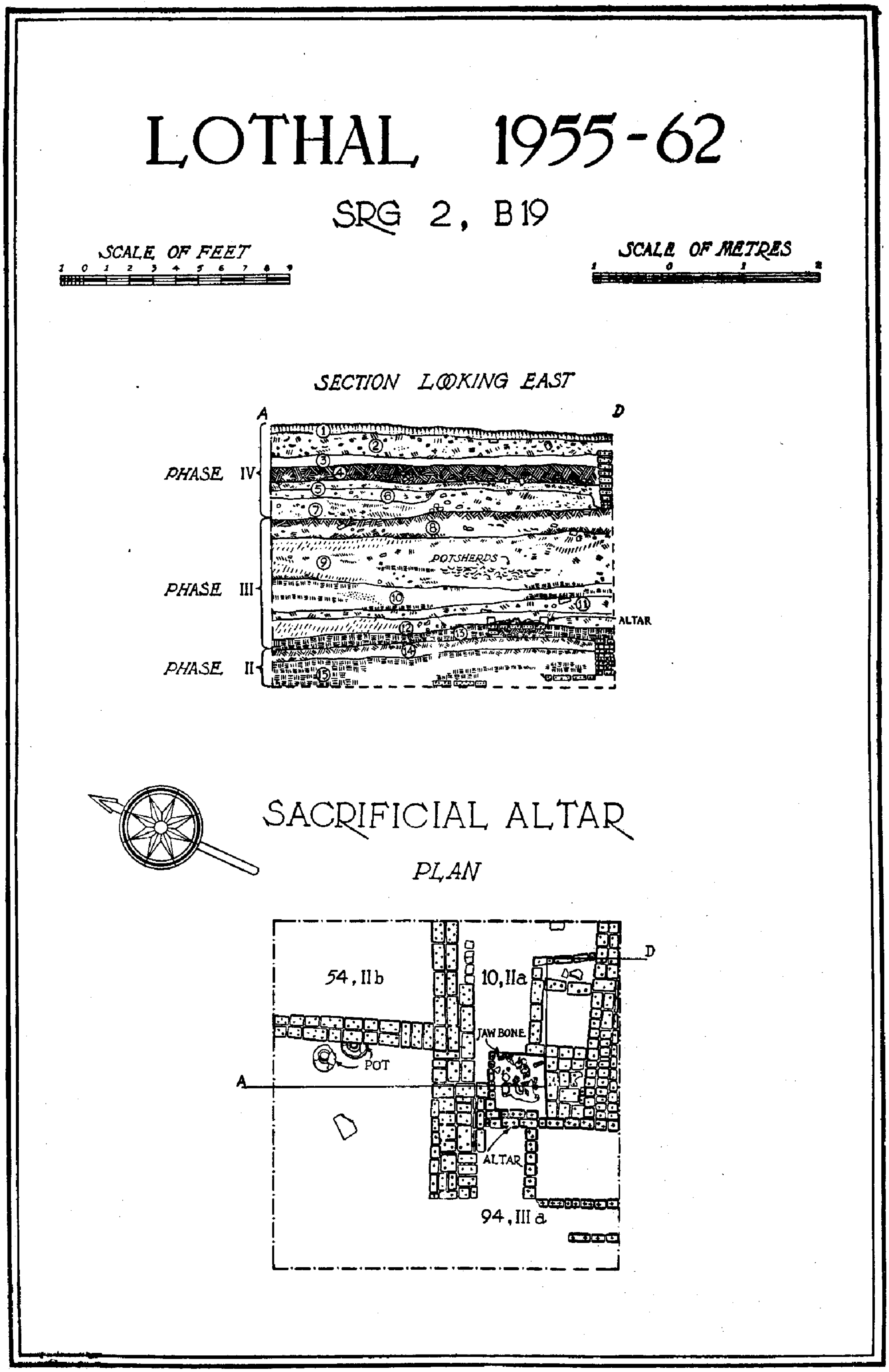

LOTHAL 1955-62
SRG 2, B19
SCALE OF FEET
SCALE OF METRES
SECTION LOOKING EAST
A
D
PHASE IV
PHASE III
PHASE II
POTSHERDS
ALTAR
SACRIFICIAL ALTAR
PLAN
54, IIb
10, IIa
JAW BONE
POT
A
D
ALTAR
94, III a

FIG. 13.

trade. To the north of the merchant's house traces of a mud-brick wall (25a), a drain of burnt-bricks (95b) and a soakage jar at its north end, all suggesting the existence of a small house with a regular drain are seen in C 25. The house appears to have been rebuilt and additions made to it in phase IIIb. To the east of the row of houses of phase IVa some remains of drains and soak pits are noticed in A 21—A 22. Owing to the highly disturbed nature of occupation deposits it is difficult to say precisely to which phase they belong. But in view of the fact that they are sealed by layer 6 they are provisionally assigned to phase IIIa. A covered burnt-brick drain and two mud-brick walls encountered in SRG 16 and opening into lane 4, running parallel to Street 1, are assignable to phase IIIb. Out of three soakage jars noticed in lane 4 the central one is assigned to phase IIIa and the other two to phase IIIb. All the three are embedded in a straight row in pits lined with baked bricks along the rims.

A house partially laid bare in A 19 has two mud-brick walls, one running north-south and the other east-west, indicating two rooms. The foundation of the walls is laid in layer 9. A mud-brick altar measuring 2 ft. 9 in. × 3 ft. 6 in. (fig. 13; pl. CCCI) was found to contain charred mandible of a bovine, a gold pendant, a carnelian bead and three painted potsherds. The presence of animal remains, gold ornament, etc., in the altar is not accidental. In this connection it may be mentioned that the statue of the priest from Mohenjo-daro[1] is found to wear on the forehead a pendant of the type found in the altar at Lothal, which appears to have been specially built for performing a ritual involving animal-sacrifice. The mud-brick walls of the house in which the altar is situated are 11 in. to 1 ft. 2 in. thick. The full plan of the house could not be ascertained owing to the limited space available for excavation in the lower levels.

A mud-brick platform with a baked-brick veneer (89a and b) is traced over a length of 40 ft. on the western margin of Street 1 between C 29 and C 31 (pl. XLVIB). It runs almost parallel to the mud-brick platform on the eastern edge of the street. To the north of C 31 the platform and burnt-brick veneer are damaged so heavily that all that now remains is the debris of disintegrated mud bricks. The burnt-brick veneer has disappeared over a major portion in the upper half of the platform except in C 30 where eight courses covering the full height of the mud-brick platform are intact. A drain (90) cutting through the platform and veneer opens into Street 1.

Remnants of a mud-brick platform assignable to phase IIIa are seen at the junction of streets 1 and 9 and in SRG 5. About three hundred feet south of Street 9 two mud-brick houses, each having a verandah and a room (pl. XLVIIA), are partially exposed in E 13 and E 14 wherein a burnt-brick drain running north-south suggests the existence of a street (Street 5). It is partly seen in Blocks 'E' and 'F' on the south and in Block 'G' on the north running almost parallel to Street 1. The houses laid bare in E 13—E 14 comprise of more than two rooms each. The open space between the two houses serving as a passage or municipal conservancy lane is 4 ft. wide. (pl. XLVIIB). The second house (situated on the north), which is larger than the first one, has a small mud-brick enclosure wherein a

[1] Sir John Marshall *Mohenjo-daro and the Indus Civilization* (London 1931), Vol. III. pl. XCVIII, 1.

broken pot, two stone-grinders and a large chank shell have been found (pls. XLVIIA and XLVIIIA). It may have been a place of worship.

(ii) *Phase IIIb*

Some houses were rebuilt in phase IIIb and a few were added on both margins of Street 1. A mud-brick house, of which only one room is traceable (132), encroached on Street 9 in D 28. A mud-brick platform of phase IIIa in C 26 reconstructed in phase IIIb and a cross wall of one course of mud bricks (133) is all that is left of the superimposed building. The burnt-brick drain (134) was added in the same phase, but two other cross walls (94a and 94b) of phase IIIa had to be rebuilt in phase IIIb along with a drain. Further north, remnants of two drains, one in C 18 (135) and another between C 17 and C 18 (136), are noticed near coppersmith's workshop in Street 1.

The existence of a lane (Lane 4) parallel to Street 1 is indicated by the drains and soakage jars built in a straight row in a north-south direction between B 19 and B 21. A drain opening into a soak-pit (142) and a soakage jar with remnants of brick-lining (141) are visible in B 21 and two walls of baked-bricks running north-south (140a and b) are laid bare in B 19. Lastly, mention may be made of a drain between SRG 16 and SRG 2, B 20. Evidence of continued use of soakage jars and soak-pits in phase IIIb is provided for the first time in the central sector of Block A.

Of the two parallel streets, 1 and 5, the latter appears to have extended into SRG 2, E-series upto Street 8 on the south and 9 on the north. Similarly, Lane 4 in Street 1 might have extended in both directions in B series, but it is doubtful whether Street 9 was laid out earlier than phase III. The width of Street 5 is 10 ft. at the northern end and 16 ft. at the southern extremity, but it is more in the centre. Street 9 was originally 32 ft. wide. The great flood at the end of phase IIIb which razed houses in Block A to the ground and deposited enormous quantities of debris in the streets and lanes smashed all hopes of rebuilding the town on a grand scale in a well-planned manner.

D. Phase IV

The inhabitants who returned to the town in phase IV after the recession of the flood levelled up the debris and built small rickety houses and even extended the area of occupation in certain sectors. But there was a sharp decline in the standard of constructions, perhaps due to adverse economic conditions aggravated by the disappearance of an inspiring political authority. Some semblance of planning was however maintained by following the earlier alignments of streets as far as possible in Block 'A'. This is not true of other blocks. Workshops where several artisans of the same trade could work together under a single roof sprang up in the Lower Town, but the sanitary arrangements in the residential quarters of the workers were unsatisfactory. Brick-bats and terracotta balls were used for paving baths and constructing drains. Mostly soakage jars were used in the Acropolis and elsewhere as some of the earlier drains were buried deep under the flood-debris. More important buildings assigned to phases IV and V are described below (pls. XLVIIIB and XLIX).

A mud-brick wall (148) and a drain of baked bricks laid on edge (147) on a platform in B 31—B 32 run almost parallel to the drain of phase IIIb in B 33. This drain is rather shabbily constructed with bricks removed from some other structure. For a considerable distance to the south of these shabby constructions all traces of buildings built in phase IV are wiped out. The next building on the eastern edge of Street 1 is a mud-brick house with a wall (149), encountered in C 26—C 27 and a drain of burnt bricks discharging water into a soakage jar (150) in B 25. Both stand on the debris of phase IIIb. A mud-brick floor of a house (151), of which only one room is traceable in C 25, has a bath paved with burnt-bricks to the south of which is seen a mud-brick house in B 24—C 24 having three rooms, a mud-brick fire-altar and a drain built of brickbats discharging into Street 1. Adjoining the house in C 24 is a drain of burnt-bricks (153) laid on edge. Lane 2 of phase IIa, running east-west and joining the eastern margin of Street 1 continued to be in use in phase IVa as indicated by the gap between structures 152 in C 24 and 153 in C 22—C 21. The width of Street 1 is, however, reduced in phase IV to 10 ft. in the central sector from 18 ft. in the northern end. Some of the shops are located in the central sector between B 22—C 22 and B 18—C 18. A mud-brick structure with two rooms (153) built in C 22 has its foundation laid in layer 6 consisting of debris. It is bound by Street 1 on the west and lane 2 on the north (pl. LA). On the south is what is considered to be a coppersmith's workshop (154) which consists of two rooms only. The walls of Str. 153 are 1 ft. 10 in. wide, while those of Str. 154 vary from 1 ft. 10 in. to 2 ft. 4 in. in width. Both appear to be shops. A post-hole is seen in the northern section of the shop 153.

Coppersmith's Workshop.—The mud-brick structure (154) consists of two rooms measuring 10 × 12 ft. and 12 × 8 ft. internally, the overall measurement being 17 × 24 ft. A furnace, rectangular on plan, measuring 2 ft. 6 in. × 2 ft. is skirted by burnt-bricks placed vertically on end (pl. LB). A cubical anvil of sand-stone bearing use marks was found closeby. Other finds from the workshop include a copper chisel and two terracotta crucibles. A unique feature of the construction of the shop is that the cross walls providing entrance to the furnace-room are not built in one straight line (pl. XLIX). Another remarkable feature of the workshop is the provision of a niche in the outer face of the western wall on the road side. Perhaps an oil lamp was kept in it. Such niches meant for lamps in the outer wall of the present-day houses at Gundi and Saragwala may be survivals of an ancient tradition. The foundation of the houses raised on rammed flood-borne debris and the mud-bricks used for the superstructure disintegrate easily when exposed to rain and sun. The salt-charged soil is also partly responsible for the quick disintegration of bricks. A portion of the northern wall of the furnace-room is damaged by fire, but there is no evidence of any wholesale burning. Lane 3 running east-west and connecting Street 1 with Lane 4 is 6 ft. wide. To its south is a mud-brick platform (pl. LIA), 2 ft. 6 in. high, which acts as a plinth for house (155) built in B 18—B 20 extending upto C 18—C 20. The walls are 1 ft. 10 in. wide and four courses of mud-bricks are seen above the plinth. Grids B 18—B 20 and C 18—C 20 have been cut in to reach the structures in the lower levels. The foundation of the platform on which house 155 stands is laid in layer 6 consisting of flood debris. Originally there were only two rooms in the house each measuring 12 ft. × 8 ft. internally. Subsequently the northern room was partitioned and one more room was added on the eastern side. A

circular mud enclosure, 1 ft. 6 in. in diameter noticed in the southern room, is plastered internally to serve as a base for a storage jar of the type found *in situ* in the northern room. Among the more significant finds from the house mention may be made of a steatite seal, shell bangles and beads of shell, carnelian and steatite kept in the jar. Perhaps this structure was also a shop.

A mud-brick house (156) with a brick-paved bath partially exposed in SRG 16 (pl. LIB) is an important evidence to show that houses were built on the eastern margin of Lane 4 also. A large storage jar of thick red ware was found embedded in the floor of the said house in SRG 16.

A house of medium size (157) measuring 17 ft. × 20 ft. with four rooms is partially traced on a 2 ft. high mud-brick platform slightly encroaching on the western margin of Street 1 in D 18 and D 19 (pl. LII). The main walls are 3 ft. thick and the subsidiary ones 2 ft. 2 in. The rooms also vary in size from 10 ft. × 8 ft. 6 in. to 11 × 4 ft. The original width of the street is reduced here to 9 ft. because of the encroachment in phase IV. A dump of shells (gastropods) found in one of the front rooms of the house must have been collected by the occupants for making necklace of beads. The unfinished bangles and rejected cores of chank-shell found here suggest that the structure was a shell-worker's shop. It appears to have extended upto Street 5 on the west. Another shell-worker's house (158) built adjoining this building on the north has a verandah, two rooms and a bath paved with brick-bats. A drain underlies the southern wall of one of its rooms. Flood has washed away the northern portion of the building and the western part has not been excavated. Hence the plan is incomplete. It is surprising to find that the north-south inner wall does not run parallel to the edge of the verandah. The poor quality of the mud-bricks, the failure to build walls parallel to one another and the half-hearted construction of drains reveal the low standard of masonry work in phase IVa. Some additions appear to have been made to this building in phase IVb.

A house situated at the junction of Street 1 and Street 9 and extending over SRG 2, D 24—C 26, E 25—E 26 and F 25—F 27 is referred to under Block G. It may however be noted here that it stands overlooking both the streets and consists of a large verandah, two rooms and a large hall also. The fire altar of burnt-bricks presumed to have been used for fire-worship in Street 9 is referred to under Block G (below p. 120). Further north is a mud-brick structure (163) with two walls laid bare in D 29—C 30. The baked brick pavement (162) seen in D 29 indicates the existence of a bath attached to this house. Only one room of the building is exposed. Some disintegrated mud bricks and a heap of burnt bricks washed down from the structures of phase IVa are noticeable here. The northernmost structure of phase IVb in Block A is a drain of burnt-bricks (174a) set on edge in a north-south direction adjacent to a brick-paved floor (174b) in SRG 2, B 33. Both stand on the same platform of mud-bricks. Except for minor additions here and there no important building was raised in phase IVc in the northern sector. In the central sector, however, two rooms were added to a house (155) of phase IVa in C 17—C 18 forming a new unit (175) where remarkable evidences of domestic fire-worship are found. Two jars of red ware and three mud-brick altars, one of which is circular, and the other rectangular, on plan were traced in

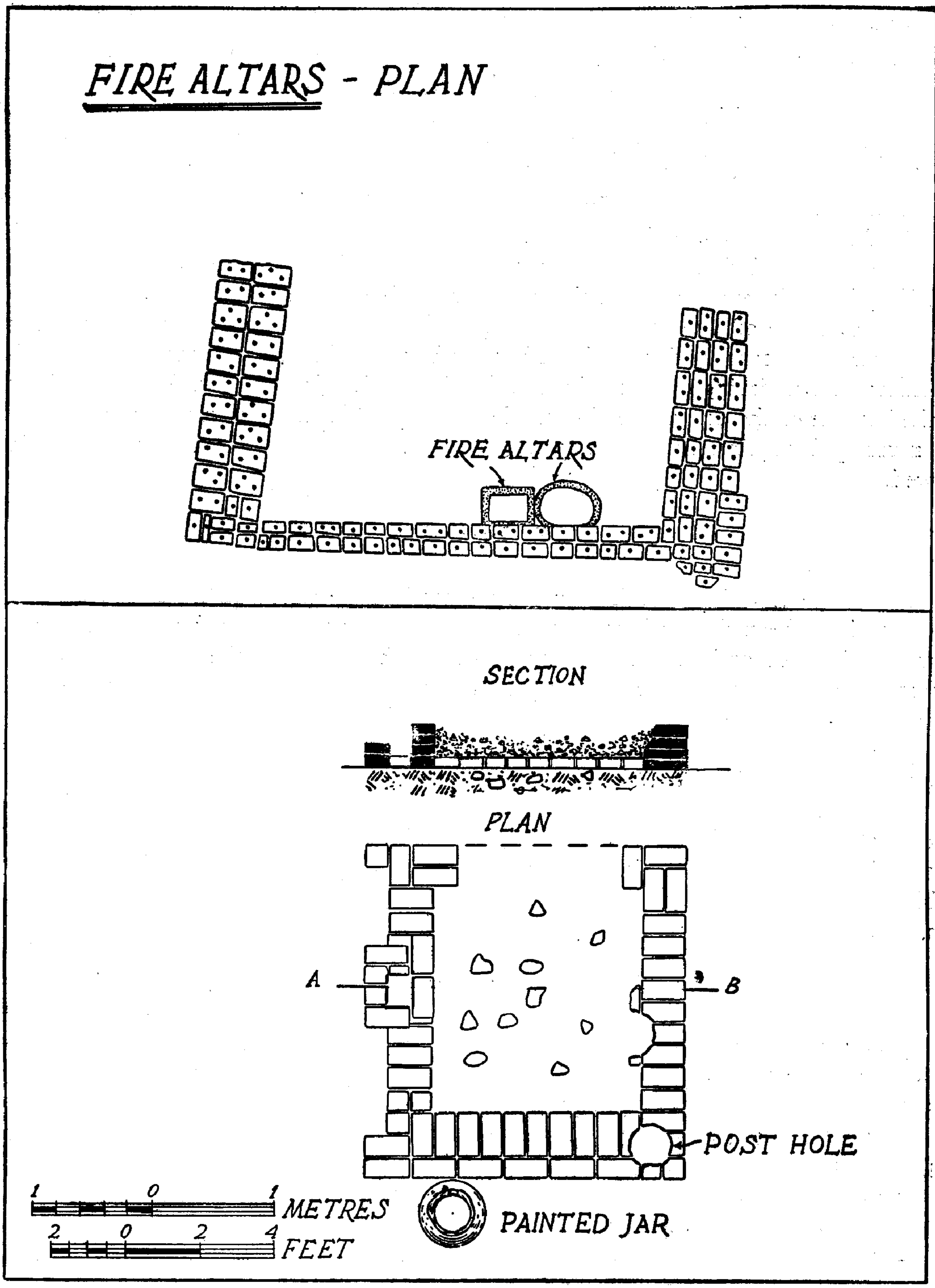


FIG. 14

Two fire altars (above) with mud - walls in a mud brick house, and (below) a brick-lined fire altar in Street 9, Block G.

the northern room facing Street 1 (pl. LIIIA). They are numbered A, B and C. The circular altars are 2 ft. to 2 ft. 5 in. in diameter, and their walls are mud-plastered. The rectangular altar measuring 1 ft. × 1 ft. 6 in. contained terracotta triangular cakes and balls. Ash was found in all the three enclosures which appear to have been used for a ritualistic purpose such as fire-worship. Two jars were found in the room where altars were built. It may be mentioned here that in two other instances also large jars were found near brick altars presumably for keeping sacred water.

At the northern extremity of Block A, remnants of a drain paved with burnt bricks (179) are seen underlying a shabbily constructed drain of phase V in SRG 2, B 28 (pl. LIV), but it is separated from the latter by a debris layer.

The evidence of reconstruction in phase IVb in the western row is seen in a house (178) having a room and paved with mud bricks. The house measures 15 × 32 ft. Remnants of two drains are laid bare in D 20—D 21. Traces of a brick-paved bath attached to one of the drains are also visible. In phase IVb the constructions were shabby and municipal regulations regarding maintenance of sanitation etc., were not strictly followed.

E. Phase V

The entire township was destroyed by a flood at the end of phase IVb and the site appears to have been deserted for sometime until it was reoccupied by a small group of artisans, fishermen and farmers, but they did not have either the resources to build comfortable houses with proper planning or the zeal to do so. They found that the earlier streets were buried deep under flood-borne debris which they superficially levelled up to raise some rickety houses on it. Although much time had not lapsed between the destruction of the town in phase IVb and its reoccupation in Phase Va the earlier alignments of houses and drains could not be easily made out. It is however remarkable that even in their poverty stricken condition the Lothal folk continued to build small baths and drains by reusing bricks collected from the debris. Ablution being a necessity and a ritual with them, the inhabitants made use of whatever material they could lay their hands upon for building baths.

(i) *Phase Va*

A small house (180) consisting of two rooms has been partially exposed in SRG 2, A 34 near the peripheral wall at the northern end of Block 'A'. Its main wall running east-west is built of burnt bricks and brick-bats, while the cross-wall is of mud-bricks (pl. LIVA) Almost adjoining this structure is another house (181) in B 33, of which only one room could be made out from the extant walls of burnt-bricks which differ considerably from those of the preceding phases in their alignment. It is not possible to make out any plan from the stray walls (183 and 182b).

Smithy (fig. 15).—A shabbily constructed pavement of burnt bricks (182a) in A 29 and four more similar structures in A 28—A 29 are unusual in plan and purpose of construction.

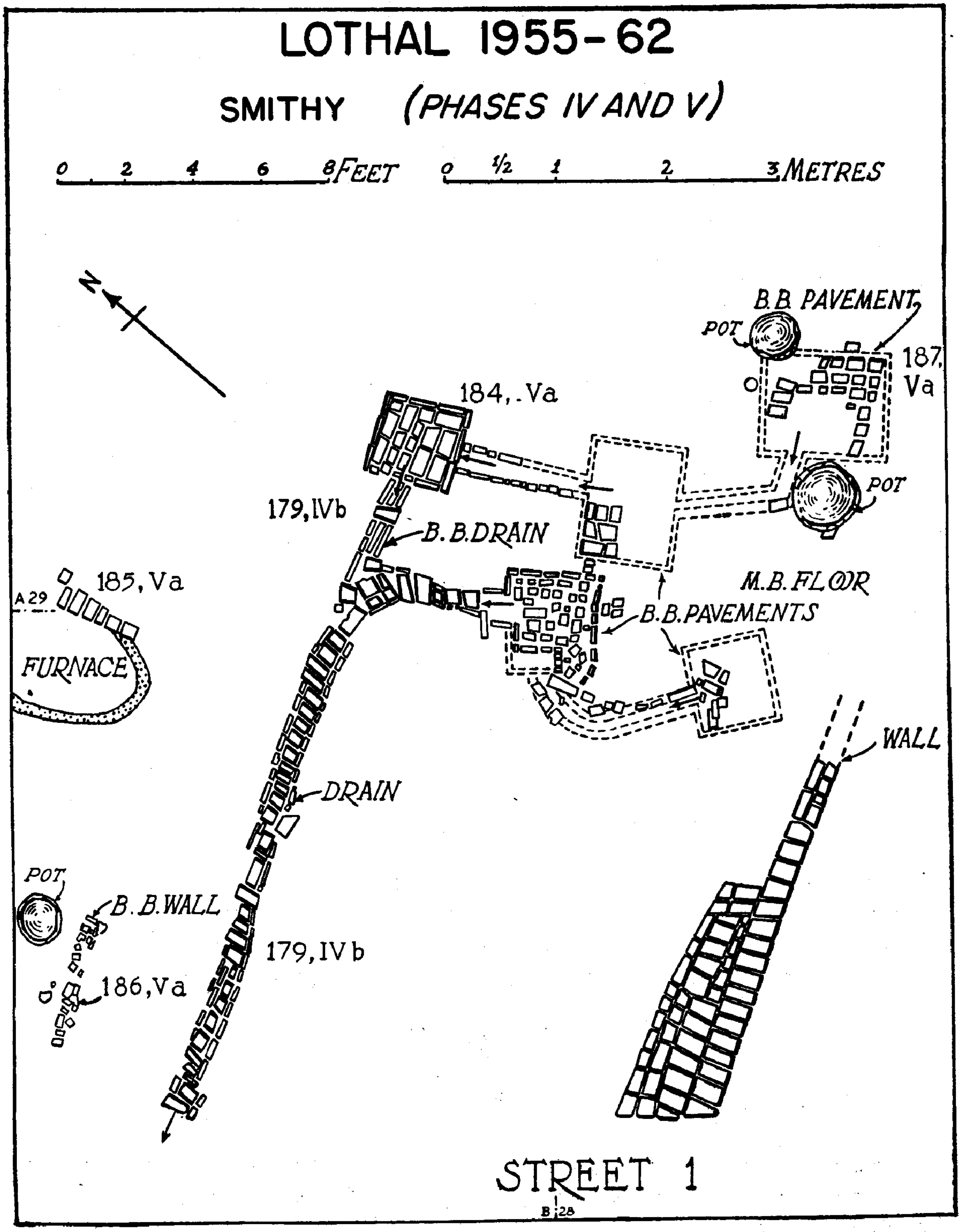

LOTHAL 1955-62
SMITHY (PHASES IV AND V)
0 2 4 6 8 FEET
0 1/2 1 2 3 METRES
N
B.B. PAVEMENT
POT
187, Va
184, Va
POT
179, IVb
B.B. DRAIN
185, Va
A29
FURNACE
M.B. FLOOR
B.B. PAVEMENTS
WALL
DRAIN
POT
B.B. WALL
179, IVb
186, Va
STREET 1
B 28

Fig. 15.

Four brick-skirted pavements (184a, 184c, 184d and 184h) measuring 2 ft. 6 in. × 2 ft. 6 in. and 3 ft. 8 in. × 3 ft. 8 in. are interconnected by shabbily constructed drains having a common outlet (fig. 15, pl. LIVB). These pavements are too small to serve the purpose of baths. Furthermore five baths would be redundant in a house measuring 10 x 20 ft. There are fortunately other evidences to determine the purpose of constructing so many pavements. The deliberately halved jars containing ash found near the pavements were used as pot-furnaces, while the terracotta crucibles and copper objects recovered here suggest that the establishment was a smithy. The proximity to the nullah indicates that these pavements were used for cooling the hot metal objects. As Lothal continued to be an important centre for working copper tools, weapons and ornaments in phase V, the miniature pavements and pot-furnaces confirm that a large smithy was established here to enable several coppersmiths to work under one roof and perhaps under the guidance of a merchant-manager. Mention has been made earlier that a coppersmith's workshop existed here in phase III also (above p. 83).

Two burnt-brick walls (185 and 186) laid bare in B 28 and a pavement of burnt-bricks traced in A 27 must have formed part of the smithy (184a to f) referred to above. A drain built of brick-bats and connected with a brick-paved bath in a house (188) as also remnants of a mud-brick floor traced in C 24.

(ii) *Phase Vb*

The only evidence of structural activity in this phase comes from SRG 2, B 28, wherein a covered drain (197b) connected with a bath discharges itself in Street 1.

4. BLOCK 'B'

A. Phase I

There is hardly any trace of structures of phase I in Block 'B'. Some remnants of what looks like a mud-brick wall or platform assignable to phase I have been found in SRG 1 besides disintegrated mud-bricks and patches of mud-brick floors. Obviously, the mud-brick wallings must have melted away in the floods at the end of phase I.

B. Phase II

(i) *Phase IIa*

Block B was carefully planned and constructed in phase IIa. However, the subsidence of drains, floors and walls raised on the earth-filling took place some time later necessitating thereby the raising of floor levels, adding new outlets for baths and changing the direction of the flow of runnels in phase IIb. Some additions and alterations were also made to the buildings in Phase IIc. But on the whole, the basic plan of Block 'B' as laid out in phase IIa was not altered. Hence the original layout is described below with occasional references

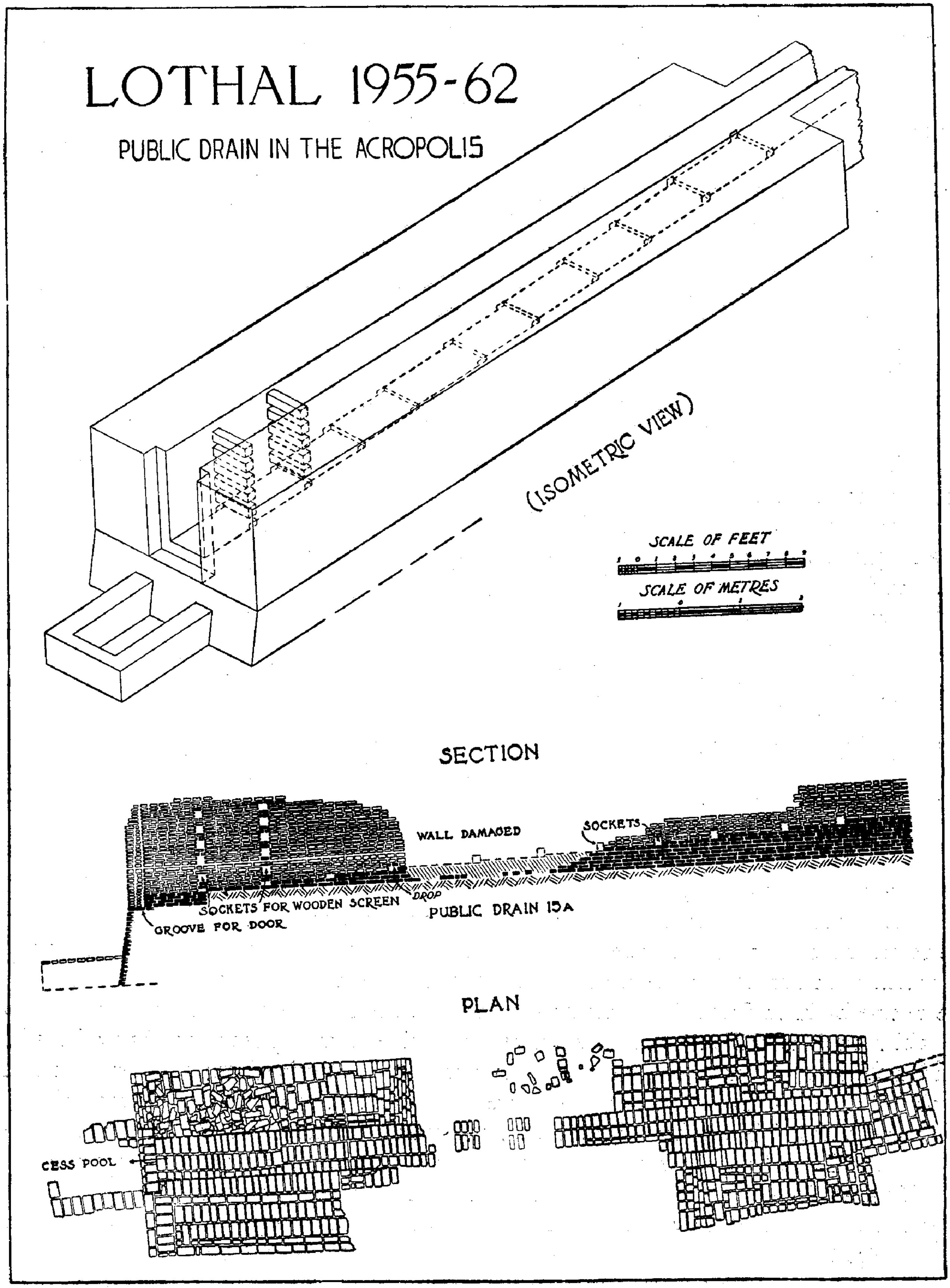

LOTHAL 1955-62
PUBLIC DRAIN IN THE ACROPOLIS
(ISOMETRIC VIEW)
SCALE OF FEET
SCALE OF METRES
SECTION
WALL DAMAGED
SOCKETS
SOCKETS FOR WOODEN SCREEN
DROP
PUBLIC DRAIN 15A
GROOVE FOR DOOR
PLAN
CESS POOL

FIG. 16.

to important additions made in phases IIb and IIc. Minor alterations are omitted to avoid confusion.

Three streets and two lanes running parallel to one another from west to east and three lanes running from north to south form a grid (pls. LVII and LVIII) in Block 'B' thus providing the necessary lines of communication between various rows of houses. The streets are more or less of the same width as in Mohenjo-daro, namely, 10 to 22 ft., the lanes being 6 to 8 ft. wide. Some of the streets in Harappa and Chanhu-daro are only 7 ft. 6 in. in width. Besides the three east-west streets a fourth one extending from north to south is indicated by the main drain running between Blocks 'C' and 'D' and connecting Street 2 with the southern arm of the peripheral wall.

A most remarkable system of underground drains, silting chambers and cess-pools was provided in Block 'B' where the ruler of the town lived. It must be said to the credit of the Lothal engineers that even the cess-pools were properly guarded against accumulation of municipal garbage by providing screens at the mouth of the main drain.

Block 'B' is a rectangle on plan measuring 418 ft. from east to west and 200 ft. from north to south. The four sides of the rectangle are formed by mud-brick platforms 40 to 80 ft. wide and 7 to 12 ft. high. The interior of the box-like structure is filled with earth to a height of 7 to 9 ft. over which a low platform of 10 to 12 courses of mud-bricks is raised. The southern arm does not extend from end to end but stops in the centre. Blocks 'C' and 'D' however help to retain the earth-filling on this side. Houses were built not only on the high mud-brick platforms forming the four arms but also on the low platform raised over the earth-filling in the centre. In fact the whole Acropolis formed a massive platform of mud bricks and mud. As most of the structures built over it are wiped out by floods, the alignment of the houses will have to be guessed on the basis of the extant remains of underground drains runnels and the main. The buildings in Block 'B' are briefly described below street by street. Streets 2, 3 and 4 and lanes 3 and 4 run parallel to one another from east to west. Lanes 1, 2 and 5 run from north to south connecting the three main streets. While all the streets are connected by Lane 1, Lane 2 connects streets 3 and 1, but Lane 5 joins Street 4 and Lane 4 only.

It is difficult to say precisely how many houses were built in Block 'B'. A guess is made on the basis of the number of baths built flanking the lanes and streets the existence of which is indicated by the drains. Whether there were twelve houses corresponding to the twelve baths in Street 2 or whether there was a single large structure with twelve rooms for ablution it is difficult to say. Apparently twelve baths appear too many for a single residential house. Hence it is presumed that there were twelve houses. There is one more public drain (15b) to which some baths were attached. The plan shows as many houses as there are baths. We are however on a surer ground in respect of the houses in Street 2, Lane 3 and Lane 5 where remnants of several walls, drains, baths and floor are visible.

Street 2.—The southernmost public drain in the Acropolis running in an east-west direction and connected by twelve runnels (30 to 39) with an equal number of baths marks Street 2 (pls. LIX and LXII). The width of this street cannot be determined as no structures are seen on its southern margin. It must have been at least 220 ft. long, if not more. The main drain consists of two parts, the eastern half (29) being wider than the western (28) half. Both

the parts slope towards the centre with a drop of 2½ ft. in 100 ft. and discharge themselves into another main drain (140) running on the slopes from north to south (pl. LIX). The wallings and floor of the eastern half of drain 9 have been robbed of all the bricks so much so that only the damp-proof layer of brick powder and a course of brick-bats used for the soling are visible. Originally this drain was a covered one. Except for a couple of roof bricks noticed at the western end (pl. LXA) all the others have been robbed or washed away by flood. Two courses of burnt bricks form the foundation while six courses account for the walls of the western half of the drain (28). The floor is made up of carefully polished bricks to produce fine joints. The main drain and the runnels are built over rammed kankar while the bath stands on a higher level over three-to-four courses of mud bricks laid over kankar and clay (pl. LXB). A wall, 11 in. thick, runs almost parallel to the main drain marking the southern limit of the bath room. If the runnel was also covered, as is likely to have been the case, each house had a verandah in the rear. The brick wall is traced between baths 31 and 33 and again between 37 and 39. Lime mortar used as binding material and plaster is found to have been ground very well. Traces of plaster can still be seen on the brick-paved floor of baths 32 and 33 (pl. LXIA). Six baths (30 to 35) in the western half of Street 2 are built on a low plinth of mud bricks raised over the kankar-filling while those in the eastern half (36 to 39) are found to have been constructed on a solid mud-brick platform. These rectangular ablution pavements measuring 8 × 8 ft. are skirted by bricks laid flat. A circular depression in one of the walls was provided for keeping the water pot. Remnants of all the runnels except no. 39 and all the baths except nos. 30, 31, 35 and 39 are still visible, some of them being wholly intact (pl. LXII). Baths 30 and 31 could not be exposed owing to the superimposed structures and soakage jars of phase IV. Originally, there existed eleven baths and one more was added in phase III after reconstructing the damaged one (38). Hardly any clue to the plans of houses or the purpose of building as many as twelve baths in a row at intervals of 18 ft. from each other (centre to centre) is available. Assuming that the remnants of the rickety wallings of phase IV (pl. LXIB) noticed to the north of bath (35) follow more or less the original alignment of the long and cross walls of the house (35) in phase II, an attempt is made to restore the lay-out of the house (35) where two rectangular enclosures, one to the north-west and another to the south-east of an east-west cross wall, have been traced. A few burnt bricks lying in the north-south direction and connecting the southern enclosures with the cross-walls are the only remains of a wall of phase II here. Another important clue is provided by two mud-brick walls of a corner house in which bath 36 is situated. These walls meet at the junction of the lane running north-south and the street running east-west thus fixing the limits of the house on the north and east and thereby determining its size also (pl. LVII). An idea of the extent of the houses and dimensions of some of the rooms can be had from the wallings in houses 35 and 36. With these dimensions as criteria it is presumed that twelve houses, each 25 to 28 ft. long and 18 ft. wide, were built in a row facing Street 3. The bath or ablution pavement built in the rear portion of the house was connected with the main drain in Street 2. Each house appears to have been divided into three apartments. The front room in the smallest house (35) overlooking Street 3 and measuring 10 ft. square internally, is separated by a partition wall from the

central room which is also 10 ft. square. The room at the rear measures 12 ft. 6 in. × 10 ft. Some houses had larger rooms measuring 15 × 10 ft. Perhaps two adjacent houses had a common wall. There were two rows of houses, one on either side of Street 3.

Twelve houses stood in the southern row and four or more in the northern row as indicated by the drains on either side.

Public drains 28 and 29 were constructed by laying one course of brick-bats for soling below a 3 in. thick layer of *surkhi* as damp-proof course (pl. XXXVI). In the case of the runnel *surkhi* was spread over rammed kankar before laying the floor-bricks. At the front where the mud-brick platform ended, the runnel from the house standing on the platform had a drop of 6 inches before joining the mains (pl. LIX). The following measurements are representative of the dimensions of the public and private drains.

Main drain 28	2 ft. 10 in. wide; 1 ft. 6 in. deep; drop of 1 ft. in 40 ft.
Runnel 33	1 ft. 10 in. wide; 1 ft. 6 in. deep.
Runnel 36	1 ft. 1 in. wide, 8 in. deep.
Runnel 38	2 ft. 3 in. wide; 8 in. deep.

All the houses were paved with mud-bricks.

STREET 3.—This street is 10 ft. wide as indicated by the corner walls of houses 36 and 27. Its full length is not known but it seems to have extended over the western and eastern platforms of Block 'B' beyond Lane 1 connecting Street 3 with Street 2 on the one hand and Street 4 on the other. The width of Lane 1 as determined by the mud-brick platform on the east and the southern turning of the burnt-brick drain 15c on the west is 7 ft. Further north of the drain, Lane 1 widens to 10 ft. Lane 2 running north-south along drain 15a connects Street 3 with Street 4 on the western side.

Five private drains (27, 18A, 73, 74 and 23) suggesting the existence of four houses between the southern margin of drain 15c and the northern margin of Street 3 are seen in lane 3 which runs between and parallel to streets 3 and 4 (pl. LXIII). The alignment of the houses on the northern flank of Street 3 is only to be guessed from the remnants of walls in the south-east corner of house 18A and a few walls in house 73. These houses have their longer axis from east to west. Some details of house 73 (pl. LXXIA) partly reconstructed in phase IIb are available. It has a room 8 × 8 ft. and a fairly large bath measuring 6 × 8 ft. connected with the drain 15 c in Lane 3 at the rear. It may be noted here that the average size of the bath in Mohenjo-daro was 8 × 6 ft. The hall or verandah of the house measuring 24×6 ft. has access from a passage on the west. A soakage jar embedded in the lane replaced the private drain built close to the house in phase IIb. Three more houses built in a row appear to have been more or less of the same dimensions. A small passage traceable between houses 27 and 73 connects Street 3 with Lane 3.

LANE 3 (pls. LVII and LXIII).—An underground drain (15c) runs along Lane 3 which is flanked by houses on either side. The southern row of houses indicated by runnels and wallings, has been referred to above.

One of the most complicated systems of baths, drains, inspection chambers and runnels which were repaired and altered in different phases and sub-phases is noticeable in Lane 3. The lane was originally 8 ft. wide in phase IIa as indicated by the brick-footings placed on edge on either margin (pl. LXIII) which incidentally fix the boundaries of the flanking houses. Later on, especially in phase IIIa, it was narrowed down to 5 ft. or even less owing to the encroachments made from both sides by extending the houses and adding soakage jars. The lane between houses 21 and 73 was 8 ft. wide in phase IIa, and was later reduced to 6 ft. in phases IIc and III. Between the water-chute built in the centre of the lane and the dye-vat (108) at the eastern extremity, four runnels are visible within a short span of 60 ft. Two of them are additions made in phases IIc and III after the earlier ones became unserviceable. House 19 assignable to phase IIa measuring 40 × 12 ft. (pl. LVII) has a bath, 6 × 6 ft. with outlets in the northern wall as well as the southern Originally, water was discharged into the main drain 15b which extended upto Lane 5, but with the collapse of the main drain water was allowed to go into the drain 15c. Some time later, the subsidence of the bath necessitated building a drain (66) superimposed over it in phase IIb (pl. LXIV). The general level of occupation was raised once again in phase III. A water-chute was built in the burnt-brick wall of a house (65a) to discharge water from the raised floor. The chute and drain (66) have a common silt-chamber near the public drain (15c) to which they are connected (pl. LXV). Lane 5 was flanked by house 19 on the west and house 20 on the east in phase IIa. The bath in house 20 built on the eastern edge of Lane 5 is paved with polished burnt bricks (pl. LXVIA). A soakage jar is also seen nearby. In the adjoining burnt-brick pavement, also skirted by bricks laid flat (21), polished bricks were used. Both appear to have formed one complex. Owing to subsidence the floor of the bath (21) was raised in phase IIb by setting bricks on edge (60). This time an additional inspection chamber was introduced with the result that the runnel takes two turns before meeting drain 15c (pl. LXIV). Other features of this phase are the introduction of runnels 62, 63 and 64 on the northern side of drain 15c and the encroachment on lane 3 by building the brick-footings (72 and 74). A burnt-brick wall (65), 2 ft. 6 in. wide, running parallel to drain 15c on its northern margin was built in phase IIb (pl. LXV). Though the purpose of construction is not clear, the building, of which it formed a part, must have been very important. Remnants of three runnels 62, 63 and 64 visible between bath 60 and the house with a dye-vat (108) are situated so close to one another that they could not have belonged to three different houses. Two of them were meant to replace the earlier runnels which must have been rendered useless owing to the subsidence of the general occupation level. Thus, only one house appears to have been built between houses 21 and 108. Extraordinary care was taken to provide outlets for water promptly and to construct inspection chambers etc., to prevent choking of the mains. Houses in Lane 3 had the most complicated system of drains and baths. Three houses namely 17, 18 and 19 stood between lanes 3 and 4 and at least two (21 and 108) between lanes 1 and 5 (pl. LVII). The burnt-brick pavement (17) in SRG 3 (pl. LXVII), where the covered drain 15b takes a turn towards the north, indicates the existence of a room, and two burnt-brick walls are also partly traceable. Adjoining it is a house (18) with a runnel joining drain 15b. In this case the floor is paved with burnt-bricks. The house with bath (19) must have been fairly large

measuring 40 x 12 ft. whereas the houses 17 and 18 are only 12 × 12 ft. It is not unlikely that they together formed one house.

Street 4.—A 7 inch-wide covered runnel running east-west along the southern edge of the northern arm of the Acropolis in SRG 2, C 1 (pl. LXIXA) provides an outlet to the brick-paved bath of house 24 built in phase IIa on the western margin of Street 4. But the full extent of the house is not known. Remnants of a cross wall are seen to the east of the bath. It is therefore suggested that house 24 had atleast two rooms with an overall measurement of 25 × 20 ft. Another bath (107) built in phase IIIa on the eastern margin of drain 15a, nearly 25 ft. north of bath 24, suggests that two houses stood between Street 4 and the northern margin of Block 'B' (pl. LXVIII). The remains of a house of phase II in the centre are covered by a mud-brick wall (105) of phase IIIa in SRG 2, B 1. Running almost parallel to the southern margin of the northern arm of the Acropolis (pl. LXVIB) this wall has an opening for a door. Towards the east a brick-paved bath and a soakage jar are the only remnants of house 57 (pl. XXXIVB) built in phase IIb in SRG 2, AX 1. A staircase (above p. 81) was built here in phase III. The full extent of this house (57) is not known but it might have measured 34 × 34 ft. including the bath, hall and room as can be made out from the traces of the mud-brick walls of the hall. Thus Street 4 was flanked by three houses namely 24, 105 and 57 on the north and 22 and 23 on the south and measures 17 ft. in width.

Lane 2.—The western arm (15a) of the main drain running from north to south (fig. 16) is flanked by brick-paved baths built alternately on the western and eastern margins. The drain was evidently a covered one as can be inferred from the roof brick of the southern arm. Even larger drains had corbelled roofs at Harappa and Mohenjo-daro. That the principle of corbelling was known to the Lothal folk is borne out by the recesses in the spillway of the dock (pl. XXVIIB). Most of the bricks from the roof have been robbed and some were found lying in heaps (pls. LXIXB and LXXA). The volume of water ultimately passing through this drain from sixteen houses must have been very large as it is found to be more than five feet deep at the northern extremity. An interesting feature of this drain is the self-cleaning device adopted by providing drops at intervals (fig. 1b). Lane 2 which closely follows the alignment of the drain is 5 to 7 ft. wide as can be made out from the paved baths flanking it (pls. LVII and LXVIII). Remnants of two burnt-brick pavements (122) and built in phase III are clearly visible on the western margin while on the eastern margin, pavement of a house (17) and a runnel (24) built in phase IIa are laid bare. The pavement 107 noticed at the northern end on the same side was built in phase III. A mud-brick floor traced near the wall on the western margin of lane 2 suggests the existence of one more house. Lane 2 flanked by three houses on either side was a blind alley connected with other parts of the Acropolis through Street 4.

A well measuring 8 ft. in diameter externally and 22 ft. deep being an important source of potable water was approachable from Lanes 2 and 3 as well as streets 3 and 4. It was damaged by flood necessitating rebuilding of the parapet twice, once in phase III and again in phase IV. The working levels of all the three phases are clearly visible.

(ii) *Phase IIb*

Some details of the additions and alterations made in the ablution pavements and runnels in phase IIb necessitated by the subsidence of the floor levels of structures raised on the earth-filling in Block 'B' have been mentioned earlier. Other significant changes are noted below. The brick-paved bath (57a) and a soakage jar were added in AX1 of SRG 2. Two mud-brick walls and a house (58), of which a rectangular brick enclosure is visible, were built in SRG 3, BX 1. Several other structures have disappeared owing to brick-robbing which took place on a large scale (pl. LXXB). Another enclosure in house (25) came into existence as an adjunct to house (58) in phase IIb. The brick pavement of the bath in house (21) laid in SRG 3, BX 2 is plastered twice with lime, first in phase IIa when bricks were laid flat and a second time in phase IIb, when they were laid on edge. A large house (65) with 2½ ft. wide burnt-brick walls is noticed along drain 15(c). One of its walls runs in the east-west direction almost parallel to drain 15c. It is during this phase that drain 66 was built over the bath (19) of phase IIa discharging itself through the inspection chamber (67) near the water-chute. The house 75, a wall of burnt-bricks (72) laid on edge and a soakage jar of house 26 reconstructed in phase IIB encroach upon the lane from the northern row while the walls of house 74 intrude from the southern margin (pl. LXXIA).

Some repairs and additions were also made to the houses in Street 2, while runnels 76, 77 and 78 were added to the row of baths connected with drain 29 (pl. LVIII).

(iii) *Phase IIc*

A soakage jar skirted with burnt-bricks laid flat along the rim is seen near a burnt-brick wall (83) and patches of brick-paved floor in SRG 3, A1—B1—all assignable to phase IIc.

C. Phase III

Some houses were built on the northern edge of the Acropolis in phase III as can be made out from the few remnants of burnt-brick pavements and wallings. A burnt-brick wall (100) uncovered in SRG 2, DX 4 and two other walls (102 and 103), also of burnt-bricks, noticed in Fx 4—HX 4 are assignable to this phase. A mud-brick wall (105) standing over rammed clay covering the ramp is one of the evidences to show that a row of houses stood on the southern edge of the northern arm of Block 'B'. Mention has already been made of the staircase (104), three treads of which have been traced in SRG 2, AX 1. Each tread is 6 in. high and 9 in. broad (above p. 81). The lowest tread stands over a low platform of eight courses of mud-bricks clearly indicating that the working level in phase III was raised by two feet above that of phase IIb. The most interesting structure in SRG 1 is a house (110) with two small chambers of mud-bricks with corbelled roof. Unfortunately, they are damaged. However, three courses of bricks built projecting over the five courses laid in plumb in the northern chamber and four courses projecting over the eight courses in plumb in the southern chamber (pl. LXXIB) clearly

show that corbelled roofs were intended. The mud bricks used in the construction are quite strong. The extant height of the walls from the floor to the roof is 2 ft. in one case and 2 ft. 2 in. in another. The floor of the chambers is made up of 2 to 3 courses of mud bricks. Each course of roof bricks projects 1 in. over the wall and patches of mud-plaster turned red due to firing can still be seen on the floor and walls. The purpose of constructing two small chambers with a corbelled roof is not known. Probably they were used for making paste-beads. Corbelling as an architectural feature was known to the Harappans in the Indus Valley also.

The burnt-brick pavement with a small drain (107) built in SRG 2, D 2 adjoining the eastern margin of drain 15a has been referred to earlier (above p. 106). Among the important structures constructed in the Acropolis in phase III is a building with three rooms one of which has a dye-vat with two jars (108) embedded at two different levels. The upper one (pl. XXXIVA) embedded in a small burnt-brick pavement measuring 2 × 2 ft. is skirted by bricks, and the water over flowing it finds an outlet through a covered drain into the lower jar which is also skirted with burnt bricks. The wall running parallel to and encroaching upon lane 3 is of burnt-bricks whereas other walls are of mud-bricks (pl. LXXIIA). The overall measurement of the dye-house which is partly built over an earlier structure is 19 ft. 6 in. × 21 ft. It looks as if dyeing was done in the palace area itself while other artisans such as lapidaries who made paste-beads worked on the outskirts of the palace.

The masons of Lothal have made several important contributions to sanitary engineering in the form of cess-pools, manholes and new types of drains. They provided recesses at the mouth of the cess-pool for inserting wooden doors or screens to prevent accumulation of rubbish. The drops noticed at regular intervals in the floor of the main drain, which is flat in the centre but sloping on either side, is another interesting feature. A more important contribution is the introduction of a manhole (113) in the form of a rectangular enclosure of burnt bricks built in SRG 3, BX 2 to a height of 1 ft. 9 in. over a large jar of red ware with a thick projected rim. There is a hole in the bottom of the jar to allow water to enter the drain 15c with which the manhole is connected by a smaller drain. Corresponding to the working level of the manhole is a burnt-brick floor in SRG 3, BX 2 (pl. LXXIIB).

To the south of the manhole are two walls (115) of brick-bats one running east-west and the other north-south, both built over the debris in phase III in SRG 3, BX 2 indicating thereby the existence of a house in phase III. Another house built in SRG 3, A2-AX 2 has a room 10 × 7½ ft. and a verandah measuring 16 × 6 ft. A saddle quern of sandstone and a small bulbous jar were found in the verandah of the house (pl. LXXIIIA). A large jar of red ware embedded in a burnt-brick pavement and covered with a stone in SRG 1 was suspected to be a burial because of the animal bones found in the jar.[1] On a closer examination, however, the occurrence of bones was found to be accidental. It might have been a dyeing vat. From this house (118) two broken jars containing fragments of an elephant's tusk were found (pl. LXXIIIB) along with two other

[1] *Indian Archaeology (1954-55) A Review,* pl XVII. B.

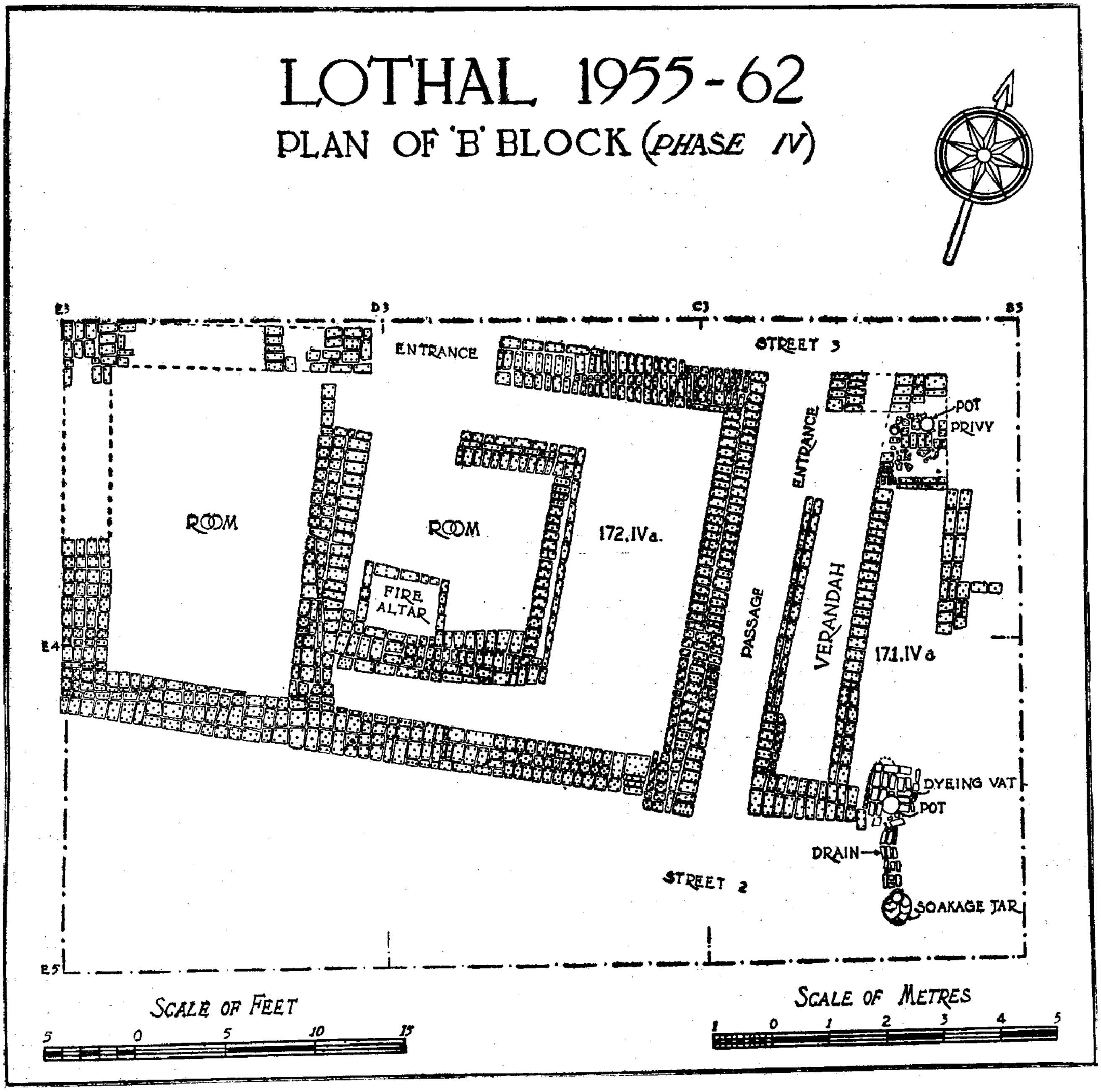

LOTHAL 1955-62
PLAN OF 'B' BLOCK (PHASE IV)
ENTRANCE
STREET 3
POT
PRIVY
ENTRANCE
ROOM
ROOM
172.IVa.
FIRE ALTAR
PASSAGE
VERANDAH
171.IVa
DYEING VAT
POT
DRAIN
STREET 2
SOAKAGE JAR
SCALE OF FEET
SCALE OF METRES

FIG. 17

pieces bearing saw-marks. Perhaps an ivory worker, like the dyer, worked in the palace area for the ruler. Two other mud-brick houses (120 and 121) were built in phase III over the debris of phase II between lanes 3 and 4. House 120 built in SRG 3, B 1—C 1 had a large hall and at least one more room as indicated by the mud-brick walls varying in thickness from 3 ft. to 2 ft. The existence of another mud-brick house (121) in A 1 to the west of the above cited house is suggested by a soakage jar skirted with burnt-bricks laid on edge in the form of an octagon (pl. LXXIVA) which must have been connected originally with a runnel of burnt-bricks laid on edge and running east to west. The jar has a 2 in. wide hole in the bottom. Remains of four structures built in phase III flanking lane 2 have been noticed. Two of them (122 and 124) are rectangular pavements of burnt-bricks flanking the western margin in SRG 2-E 2, and others (123 an 125) flank the eastern margin. An 'L'-shaped house of mud-bricks with a rectangular pavement can be made out in SRG 2, D 2—E 2 on the eastern flank of the drain. Towards the end a bath and remnants of a brick floor are noticed in SRG 3.

In late levels (Phase IV) soakage jars replaced brick-built drains which were either damaged or failed to function. Sanitary conditions deteriorated to some extent perhaps because of the failure to keep the arterial drains in good condition. Effective supervision ensuring periodical clearance of manholes and soakage jars seems to have been relaxed in phase IV everywhere.

D. Phase IV

The devastating flood which dealt a heavy blow to the prosperity of Lothal at the end of phase III caused heavy damage to the massive platforms (pl. LXXIVB). As a sequel, large quantities of debris accumulated everywhere in phase IV. After the recession of the flood-waters the residents levelled up the debris and built a low platform of six to eight courses of mud-bricks so as to provide a solid plinth for the few houses reconstructed in the Acropolis. Two of them, namely, 171 and 172, built in the southwestern corner of Block 'B' (fig. 17; pl. LXXVB) are almost similar in plan but quite different from the rest. House 172 faces Street 3, and its entrance lies through the enclosure wall. A verandah runs on three sides of a central room in which a square fire-altar of mud-bricks is visible. The room on the west is 24×15 ft. and the central room is 12 ft. 6 in. × 14 ft. Remnants of a pavement and of a drain of burnt-bricks are seen in the rear. The floor of the house is paved with mud-bricks. House 171 in C 3—C 4 is entered from a narrow passage connected with Streets 2 and 3. The front verandah of the house measures 5 ft. 3 in × 26 ft. The full extent of the hall is not known but the traces of a mud-brick wall and a rectangular enclosure of mud-bricks may suggest an inner room with a place for fire-worship similar to those noticed in the neighbouring house (172). A dye-vat with two jars (the upper one embedded in a burnt-brick pavement and the lower one placed in the street and both connected by a runnel) is noticed near the southern wall (pl. LXXVIB). Another remarkable feature of this house is the provision of a privy by embedding a jar in a burnt-brick pavement. The jar is closed by a stone as in the case of the privy noticed in house 118 (above p. 18; fig. 17).

The construction of fire-altars of mud-bricks in two houses (171 and 172) and a burnt-brick one in another house (163) for the first time in the Acropolis in phase IV is not without significance. Whereas fire-altars were common in phases II to IV in the Lower Town they are not known in the Acropolis any time prior to phase IV when small artisans such as bone-workers, dyers and bead-makers occupied it. It may therefore be concluded that the ruler had not paid much attention to religious matters, especially fire-worship in earlier times, and after he left the Acropolis, the artisans found the need to build an altar here.

There is no evidence of occupation of Block 'B' in phase V.

5. BLOCK 'C' (Warehouse)

A. Phase I

A mud-brick wall (2) of eight courses noticed in SRG 3, DX 8—EX 8 at a depth of 13 ft. is the only evidence of structural activity in phase I in Block 'C'.

B. Phase II

Before going into the details of construction of the warehouse (fig. 18; pls. LXXVII to LXXXI) which came into existence in phase II, it is necessary to refer to local tradition about this structure. Before undertaking excavation in this area the local people were worshipping some sandstone mullers in a small modern brick enclosure built on the summit of the northeast corner of the Acropolis-mound overlooking what was later on found to be a dock. According to them these stones represented the goddess *Vānuvatīmātā* (above p. 21 ff). When these stones were removed by us before commencing the excavation there was a strong protest from the villagers. As stated earlier (above p. 21) they attributed an accident that took place a few days after the removal of the stones due to the wrath of the goddess. The worship of the sea-goddess shows that Lothal was once a port and that the place chosen for the installation of the goddess was near the dock.

In the course of the excavation of Block 'C' in SRG 3, loose patches of burnt-earth were found between square patches of hard earth capping mud-bricks. On further careful digging intersecting passages, 4 ft. wide, and flanked by solid blocks of partially-burnt mud-bricks were traced at regular intervals. The blocks measuring 12 ft. square and 3 ft. high stood in three rows of four each (pl. LXXVIII). The mud-brick podium on which the blocks stand in the north-west corner is a rectangle on plan measuring 160 × 135 ft. with a maximum height of 13 ft. 6 in. on the northern side (pl. LXXIX). The slope seen towards the east and south is the result of heavy erosion by flood-waters at the end of phase III. Another point for consideration is that originally more number of blocks must have been built over this massive podium as suggested in pl. LXXXII to serve as bases of a superstructure of timber which served as a godown. A massive and solid platform covering an area of 18,200 sq. ft. would not have been built just to provide an approach to the twelve blocks covering a small area of 2520 sq. ft. only. There is ample evidence to show that the peripheral platforms on the south and east were deliberately kept low so as to provide an earthen ramp for an approach to the warehouse from the dock on the east and the fields

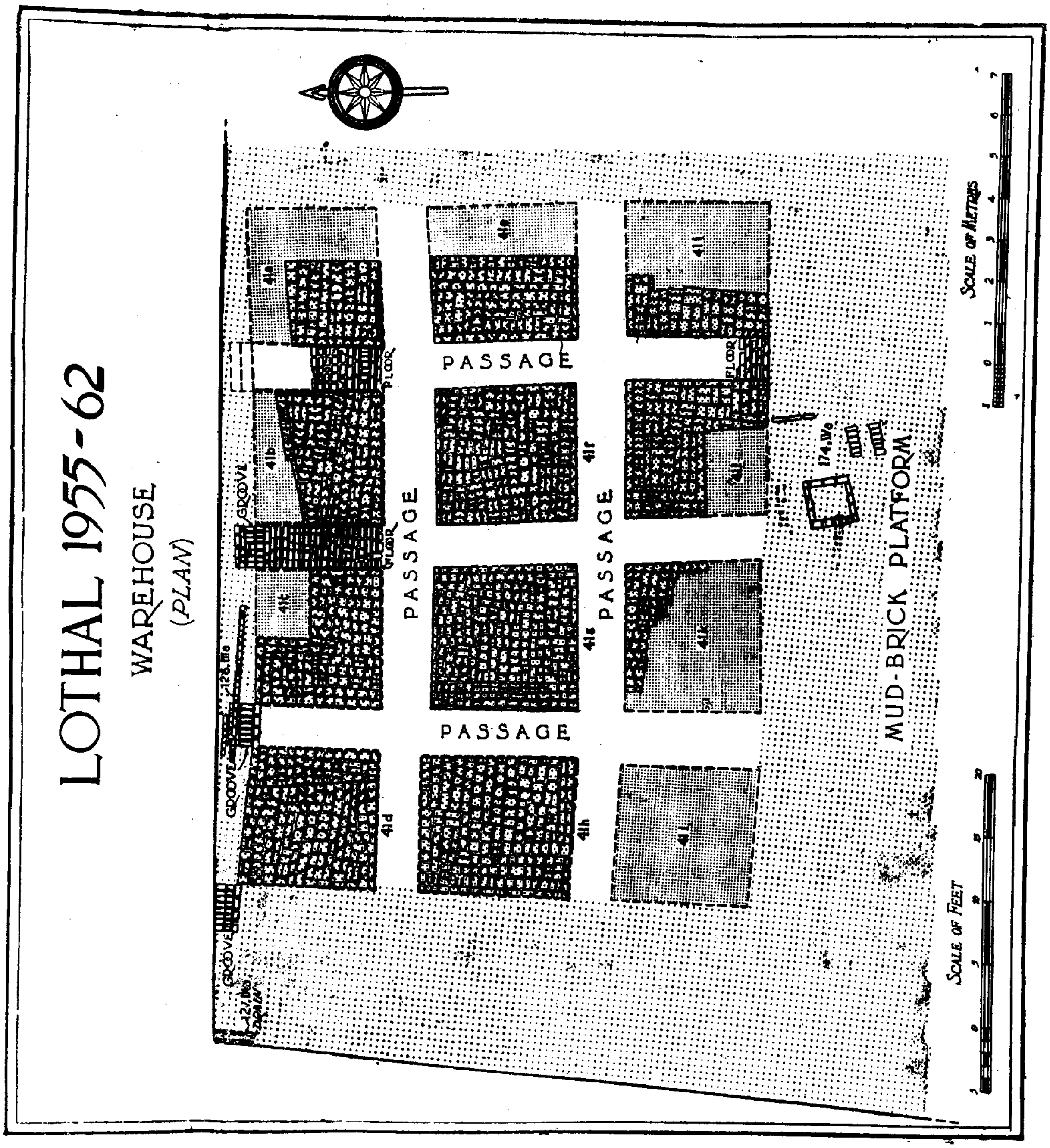

LOTHAL 1955-62
WAREHOUSE
(PLAN)
PASSAGE
PASSAGE
PASSAGE
PASSAGE
MUD-BRICK PLATFORM
GROOVE
FLOOR
SCALE OF METRES
SCALE OF FEET

FIG. 18

on the south. Street 2 slopes towards the dock while the street between drain 29A and the warehouse slopes towards the southern peripheral wall. Originally as many as sixtyfour bases must have stood on the entire podium but, now only eleven are intact and the twelfth is partly traced. For easy identification they are numbered 41a to 41 1 (fig. 18) proceeding westwards from the easternmost base in the northernmost row and finally ending with the westernmost base in the southernmost row. The drain-like grooves and the floors of the channel are numbered 41m to 41q. Base 41f in the central row is complete as can be made out from the mud-plaster which is in tact all over the surface including the sides and top. It is 12 ft. square on plan and 3 ft. 6 in. in height. All the other bases have been damaged but their full dimensions can be ascertained. All of them were built solid to a uniform size of 12 ft. square, the height being 3 ft. 6 in. The intersecting passages between the bases are 4 ft. wide and were originally paved with burnt-bricks some of which are *in situ* (pls. LXXVII A and LXXVIII). Sun-dried bricks 18×9×4 in. were used in the construction, but the surface ones on sides and top have turned red owing to contact with fire at a later stage. Ash, terracotta balls and triangular cakes, burnt lumps of clay and terracotta sealings found in the passages have served as valuable evidence for determining the purpose of constructing these bases. At the northern end of each passage, pavements of burnt-bricks with 3 in. wide drain-like grooves were noticed, but they do not run continuously (pl. LXXX). They were meant for sliding shutters to close the passages which served as air-vents. What little remains of the brick-pavement suggests that all passages were originally fully paved for easy movement of labour. The grooves existing at the remaining ends have disappeared along with the bases owing to heavy floods.

As many as 65 terracotta sealings, each bearing one or more impressions of seals, were found along with ash, burnt reeds and a charred log of wood at the southern end of the passage between blocks 41i and 41j. They were placed in successive layers above a course of burnt-bricks (pl. LXXVIIB). The mouth of the passage was blocked deliberately by a wall of loose bricks which was mud-plastered from outside. The terracotta sealings found in the southeast corner of the bases bore impressions of packing material such as reed, woven fibre and matting and of twisted cords tied into knots on their reverse, while, on the overse, impressions of Indus seals were clear enough (pl. CLXIIB). One can easily deduce from the data that wet labels of clay were affixed on packages of goods secured by cords and were sealed with one or more seals for authenticating the contents. The occurrence of a charred log of wood in the south-east corner of the passage which was intentionally blocked with bricks suggests that the fire was not accidental. At the same time it must be admitted that the burnt clay lumps bearing reed-impressions found in the passages (pl. LXXXI A) must have fallen into the passages when the roof caught fire. In any case, the original purpose of constructing Block 'C' appears to be different from using it as a 'kiln'. Its situation and massiveness and the care taken to protect it from floods by building peripheral walls suggest at once that it was a public building of great importance next only to the dock. Most probably it was a large warehouse wherein packages of goods were examined and stored. The mud-brick bases had a roof of some perishable material over them to protect goods from rain and sun. Free movement of labourers and easy hauling of goods were rendered possible on account of these passages. Most of the bases and the

entire timber-work seems to have been destroyed by floods along with the dock in in phase IIIC. In view of the vital role played by the warehouse its podium was protected against floods by a peripheral mud-brick wall which is 42 ft. wide on the southern side and 64 ft. on the eastern side. The intervening space between the peripheral walls and the podium was rammed with kankar (pl. LXXXIB). Packages of goods could be brought up the ramps from the dock on the one hand, and the southern peripheral wall on the other, into the warehouse for being sealed by the port-authorities after examining the contents. Similarly, the imported goods could be stored here until custom duties were paid. It was a clearing house for all practical purposes. Plate LXXXII shows the conjectural restoration of the warehouse which gives an idea of what the superstructure was like and suggests the possible use to which it was originally put. It may not be out of place to examine Wheeler's suggestion that Block 'C' was a granary. It is true that rice-husks have been noticed in the mud-plaster of the cubical blocks, but this does not necessarily imply that the structure was used as a granary, for the use of husks and chaff for plaster is common in India even today. It is also obvious that the structure was used for storage purposes and the passages were meant for movement of labour. The purpose of building drain-like grooves (41 1 and 41 n) is not easily explainable unless it is conceded that they were meant for sliding wooden doors, in which case the passages were conceived as airvents which could be kept open or closed as and when necessary. Wheeler is of the opinion that when the bags of grain kept sealed in the granary were reduced to ashes as a result of the timber-work of the superstructure catching fire accidentally, the burnt sealings must have fallen into the passage. The fact that all the terracotta sealings found in the warehouse bear impressions of seals other than those found at Lothal establishes that the goods kept sealed here were imported. As grains are too bulky to be imported in ships, the structure under discussion was not a granary but a warehouse for stacking other imported goods. This need not preclude stacking goods meant for export also. The present writer's excavation at Kaveripattinam, the ancient Chola capital in Tanjore District of Madras State has brought to light with raised platforms of a ware-house. The podiums at Lothal are reminiscent of those described in the Tamil epics such as the *Pattinappalai* and *Silappadhikaram* which refer to the sealing of goods with the Tiger seal (the emblem of the Chola kings) after payment of customs duty and before they were passed on to the warehouses of the merchants. It is said that goods meant for export were also stored in the warehouses. Two thousand years before Kaveripattinam came into existence Lothal folk had also built a warehouse where, perhaps, the incoming and outgoing cargo was sealed after payment of customs duties.

The massive platform forming the podium of the warehouse was built in two stages, using buffish bricks of fine alluvium for the lower part and bricks of black clay for the upper one. The earth-filling made in the upper half between Block 'B' and Block 'C' also differs in composition from that of the lower half.

C. Phase IV

Subsequent to the catastrophic flood at the end of phase III resulting in the total disappearance of a very large number of bases, some constructions of burnt-bricks in the

form of a wall and pavements were made in phase IV on the northern and southern extremities of the extant bases (fig. 18), but neither the plan nor the purpose of these constructions can be ascertained.

Among the interesting finds, besides the terracotta sealings recovered from the warehouse, is a copper jar of cancavo-convex profile revetted on the belly (fig. 19) and bearing close resemblance to the revetted jars found at Harappa and Mohenjo-daro. It was found placed on the eastern margin of one of the bases (41f), and its contents were only charcoal and earth.

6. BLOCK 'D'

An important feature of the town-planning at Lothal, as in Harappa and Mohenjo-daro, is its symmetry. Corresponding to the warehouse built in the south-east corner of the Acropolis another mud-brick platform designated here as Block 'D' for easy reference was built in the south-west corner also. The overall measurement of this platform is 96× 80 ft. and its present maximum height is 9 ft. It is eroded so heavily that no trace of any building built over it can be had (pl. LXXXIIIA). Hence the purpose of raising this huge platform cannot be ascertained. Nevertheless it provides a clue to the method of constructing massive mud-brick platforms. It is observed that between the warehouse and the western arm of platform 14d in the Acropolis kankar and clay were rammed to a height of 4 to 5 ft. Above this deposit a mud-brick platform was built over a part of the area to be raised in height, while the rest of it was filled with kankar. Finally 8 to 10 courses of mudbricks were laid all over the are a so as to obtain a solid plinth for the buildings to be raised (pl. LXXXIIIB). Occasionally box-like enclosures of mudbrick platforms were filled with earth and capped finally with mud bricks. Block 'D' was built in three stages, the first two being assignable to phase IIa and the last one to phase IV.

7. BLOCK 'E'

The cutting SRG 2 was extended beyond the western arm (14a) of the Acropolis with a view to ascertain whether any buildings were constructed in this part of the Lower Town. The excavation revealed that all the buildings in the western sector in phases II and III were completely destroyed by flood and the debris of the ruined houses which stood in the Acropolis accumulated to a thickness of 6 ft. in the Lower Town. A mud-brick house built in phase III and a few others in phase IV are laid bare in SRG 2 close to the battered wall of the Acropolis. About 100 ft. to the south of SRG 2 three mud-brick structures heavily eroded by floods were also encountered in SRG 3. Further west, however, mud-brick wallings of phases II and III are laid bare in SRG 6. Block 'E' is served by two streets, namely 5 and 8. Street 5 runs north-south and after taking a turn to the east and again to the north it joins Street 9 in Block 'G'. Street 8 runs east-west. The structures built in phases II to IV in Block E in the shadow of the Acropolis are referred to below in the chronological order.

A. Phase I

No evidence of structural activity in phase I has been found in Block 'E' except at the western extremity of SRG 6 where a 2 ft.-thick deposit of black clay underlying a mud-brick platform appears to be the remnant of the mud-bund.

B. Phase II

The earliest structure known in Block 'E' is a mud-brick house (53) traced partly in SRG 6 and partly in SRG 3, T 3-K 3. It is orientated north west-southeast and has three rooms and a verandah with an overall measurement of 28 × 48 ft. (pl. IXA). The average size of the room is 8 × 8 ft. and the walls are 2 ft. 3 ins. thick. The walls run obliquely in the cutting SRG 6, but the rooms form rectangles. Mud-brick walls of another building assignable to the same phase are noticed between Block 'D' of the Acropolis and house 53 in Block 'E', but no proper plan could be made out partly due to heavy damage it had suffered and partly to limited operations.

The western arm of the peripheral wall (14d) built in successive phases with mud and mud-bricks as an anti flood bolster along the quay has been traced in the western extremity of SRG 6. Superimposed over the eroded face of the mud-bund is a platform of 12 courses of mud-bricks (pl. LXXXIV A). The lower eight courses are assignable to phase IIa. The damage caused by flood (pl. LXXXIV B) at the end of phase II necessitated adding some more courses of bricks of which only four are now visible. The total width of the peripheral platform is 42 ft. It must have extended all along the western margin of the town as suggested by the remnants of the platform traced in the trial pits and in SRG 2, G 29 in the north-west corner. The mud bricks used in the construction are more or less of uniform size, namely, 12 × 5½ × 3 in.

C. Phase III

Mention has been made above of the reinforcement of the peripheral wall of mud-bricks in SRG 6 in phase III. Within the Lower Town itself new houses sprang up in Block 'E' during this phase. A mud-brick floor was built over a platform, 2 ft. 6 in. high, on the southern margin of Street 7 (pl. IXA), and a mud-brick house (131) with three rooms (pl. LXXXVA) was also raised over the flood debris which seals a house (53) of phase II. Another interesting feature of construction is that the floors are made up of ovoid terracotta balls and cakes which were well rammed and plastered with mud (pl. LXXXVI A). Sometimes a layer of potsherds and broken terracotta balls was also spread over the silt to serve the purpose of dry concrete. A post-hole noticed in the floor of the house suggests that the roof was supported by wooden posts besides the mud-brick walls. Storage jars noticed in two houses of phase III indicate that the occupants were not poor.

D. Phase IV

Buildings of phase IV, although built with easily disintegrating mud-bricks, are better preserved in Blocks 'E' and 'F' than anywhere else owing to the fact that they stand at a

higher level than others over the enormous flood debris of phase III washed down from the Acropolis. The foundations of the walls are shallow and of varying depths in view of the sloping ground. A mud-brick house with five rooms (168) extending over SRG 2, K 3—K 5, L 3—L 5 and M 2—M 5 (pls. LXXXVII and LXXXVIII) measures 56 ft. from east to west and 42 ft. from north to south. It is bound by Street 8 on the north, Street 5 on the east and Street 7 on the south. The largest room measuring 36 × 26 ft. is entered from Street 8 through a doorway, 5 ft. wide. A storage jar is found *in situ* on the mud-brick floor of the house. The burnt-brick pavement adjoining the northern wall seems to be a bath, for a soakage jar is also seen outside the house in Street 8. The western room in the front is 16 ft.-wide but, its length is not known. One of the rooms at the rear is 9 ft.-wide. Here again the length is not known. A burnt-brick wall, 5 in. wide, runs north-south parallel to a mud-brick wall running east-west. Remnants of a floor of three courses of bricks are also visible, but the southern limit of the house is not clear owing to heavy damage. An ovoid mud-brick enclosure built on the raised floor of the house at its southern extremity has a square stump of mud-bricks and mud in the centre (pl. LXXXVIB). Its longer axis is 6 ft. 6 in. and the shorter one 4 ft. The dwarf wall is made of mud-bricks which have turned red owing to constant firing. Unfortunately its full height is not known. It appears to be a fire-altar used for ritualistic worship of fire. Similar fire-altars have been found at Kalibangan also.

Two mud-brick walls (169) are noticed to the west of house 168, and another (167) runs east-west parallel to house 168 on the northern margin of Street 8. The alignment of the latter helps to determine the width of the street (pl. LXXXIX), but the plan and purpose of constructing this wall are not clear. It was perhaps an enclosure wall screening off the bead factory from the main street. No evidence of occupation of Block 'E' in phase V has been found so far.

8. BLOCK 'F' (pl. LXXXVII)

All the structures standing north of Street 8 but west of the Acropolis, in the Lower Town, are included in Block 'F'. Although occupation debris of phase I is encountered over a width of 50 to 60 ft. along the western arm of the Acropolis, no structural remains of this phase have come to notice.

A. Phase II

A mud-brick platform (165) assignable to phase IIa is noticed in SRG 2, I 10—I 11. It is heavily eroded and the extant height is 4 ft. only. Originally it must have been higher. Some burnt-bricks and jars found *in situ* on the platform (pl. LXXIX B) suggest that houses were also raised on mud-brick platforms in Block 'F' in phase II.

B. Phase III

Reference was made earlier to a mud-brick house (130) assignable to phase IIIa laid bare in SRG 2 at the foot of the north-western corner of the Acropolis on the eastern margin

of Street 5 (above p. 87). It was subject to frequent floods as a result of which even the 4 ft. thick wall of the building has been damaged heavily. The cross walls of the verandah are 2 ft. thick and the long wall 1 ft. thick. The available dimensions of the house with the verandah and two rooms are 38 × 16 ft.

C. Phase IV

(i) *Bead factory pls. XC A, B & C*

The largest structure ever built in phase IV is the bead factory (164) situated on the northern margin of Street 8 and bound by Street 5 on the east. It consists of a central courtyard with a mud-brick platform entered by a covered passage on the north-west and surrounded by a double row of rooms on the north and east. The courtyard and rooms, eleven in number, seem to have been enclosed by a mud-brick wall (167) partially laid bare to the south-west of the factory, the full extent of which is not yet known. It is found to extend into SRG 2, J 10—K 11, L 8—L 11, M 8—M 11 and N 8—N 11 covering an area of nearly 5000 sq. ft. The central courtyard measures 38½ × 23½ ft. externally. Two jars, one containing 600 finished carnelian beads and the other containing beads in various stages of manufacture were found embedded in the mud-brick platform in the courtyard. Two other pots were noticed in the room west of the courtyard which has an independent entrance and is cut off from the courtyard and living rooms. Internally some of the rooms measure 20 × 13 ft; 10 × 6 ft; 15 × 19 ft. The row of rooms in the northwest is approachable from the east while the inner row of northern rooms can be reached from the north-west and north-east. A large room in the eastern row is approachable from the courtyard whereas the adjoining room on the south has an access from the verandah opening towards Street 5. Two rooms in the north-east corner served as store rooms. The arrangement of rooms, courtyard, covered passages and stores etc., reveals a high degree of planning in establishing factories. The workers lived in the rooms built around the working platform in the central courtyard. The controlled entrance through a covered passage from a lane, instead of the main street, and the provision of an enclosure wall are all significant from the point of view of security. The main reason for considering the building as a factory of bead-workers is that pebbles of agate, hundreds of carnelian beads in various stages of manufacture, rejected cores and flakes and a jar containing finished beads were found in the building. Secondly, a kiln for cooking agate pebbles and finished carnelian beads is situated closeby. Thirdly, a flanged drill meant for drilling holes in the beads (pl. CCXXXIXB 3-4) was found in one of the rooms. It is therefore reasonable to suppose that a factory of lapidaries engaged in making stone beads was established here. Simultaneously a factory of coppersmiths was also established at the northern end of Block 'A'.

(ii) *Bead-kiln (fig. 12; pl. XCI)*

A circular kiln having an opening on the north (166) was laid bare in SRG 2, I 10 in close proximity to the bead factory. The 3 in. thick dwarf wall of the kiln is built of thin

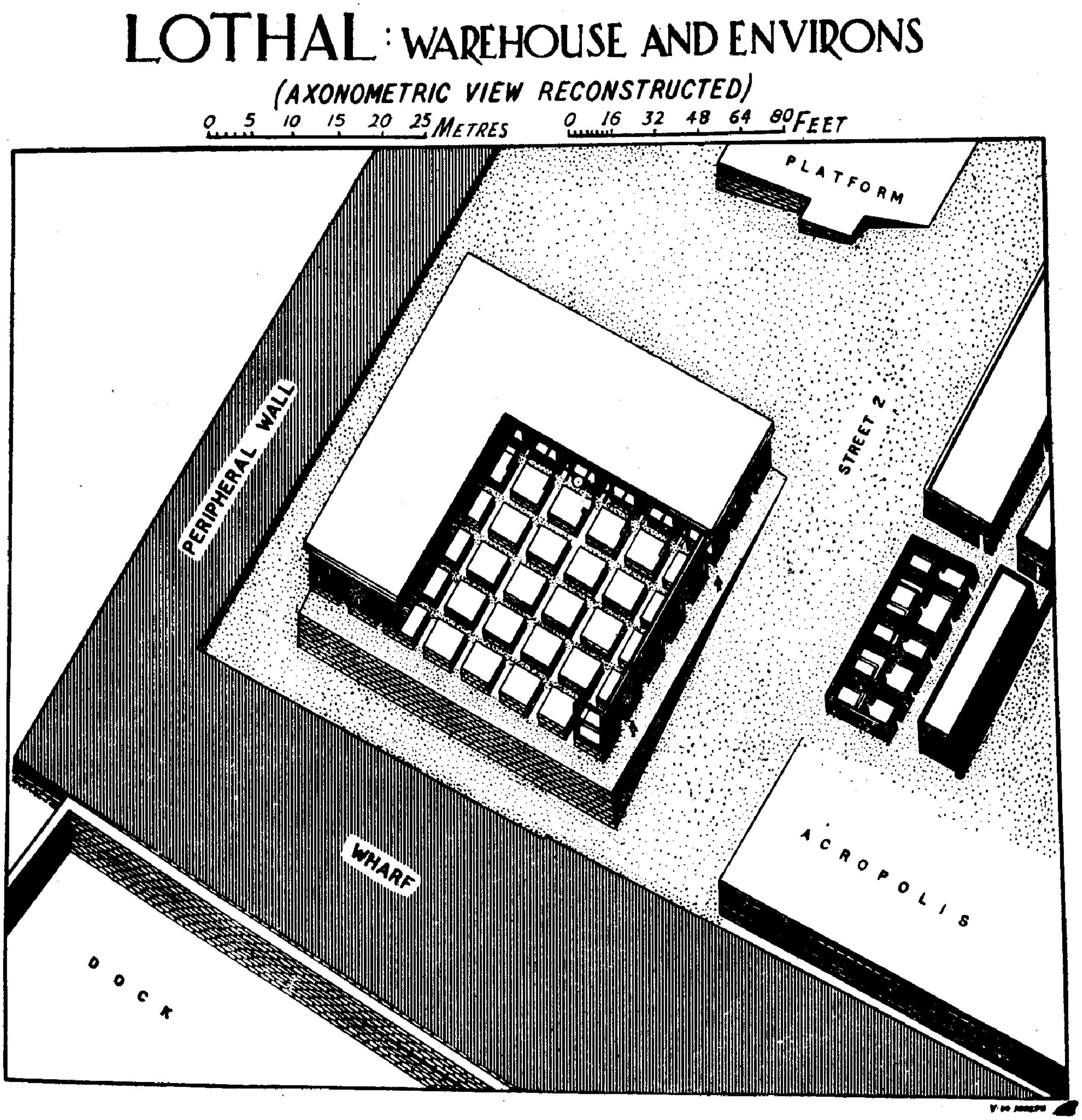

LOTHAL: WAREHOUSE AND ENVIRONS
(AXONOMETRIC VIEW RECONSTRUCTED)
0 5 10 15 20 25 METRES
0 16 32 48 64 80 FEET
PLATFORM
PERIPHERAL WALL
STREET 2
WHARF
ACROPOLIS
DOCK

Fig. 18A

burnt-bricks and plastered with mud. Its internal diameter is 4 ft. 2 in. and the axis running across the stokehole (mouth) of the kiln measures 8 ft. 8 in. It is doubtful whether the kiln had any roof at all, domed or otherwise. All the four flues in the upper chamber are interconnected among themselves and with the mouth of the kiln in the lower chamber through which fuel was supplied (pl. XCIA). The undersurface of the upper chamber was also mud-plastered and has turned red owing to firing. The flues are 6 to 7 in. wide while the stoke hole is 3 ft. long and 2 ft. wide.

It is interesting to note that the lapidaries of Lothal had discovered that the cortex of the pebble could be softened for easy chipping by heating it. They also knew how to produce carnelian by cooking agate slowly in a oven. This is exactly what the lapidaries of Cambay also do today. They cook agate pebbles in pots filled with saw dust. On the other hand, the bead-makers of Lothal had a regular kiln built for this purpose as they had to cook pebbles and heat the beads on a large scale. Agate flakes, finished beads of carnelian, baked and unbaked pebbles and broken earthen bowls used as containers found in the vicinity of the kiln establish that it was used in processing stone beads. The kiln is too small for firing pots and unsuited for other types of firing at high temperature. Thelo wer chamber which is intact, contained a lot of ash of reeds and cow-dung. The floor of the upper chamber is undistrubed and even now the reed marks on the mud-plaster can be seen. A cinder-dump noticed nearby confirms the use of the kiln for a long time (pl. XCIB).

As deeper digging was not undertaken in Block 'F' no structural remains of earlier phases could be traced.

9. BLOCK 'G'

With increased pressure of population the township expanded slowly towards the west from Street 1 and developed into a separate sector served by Street 9. This sector is designated as Block 'G'. The reluctance of the inhabitants to build houses near the cemetery in the early phases is the main reason for lack of evidence of any structural activity in phase I Though stray stumps of mud-brick walls of phase I are noticed near Street 1, it is not until phase III that this block came to be properly planned by laying out Street 9 which runs east-west connecting Street 1 with the cemetery. Simultaneously, Street 5 was also extended northwards thus connecting Block 'G' with Bock 'F'. A number of lanes, of which two are partially traced, were also laid out here.

A. Phase III

As we have no evidence of any burial of phases I and II in the cemetery or of any structural remains of these phases in Block 'G', it is likely that Street 9 did not exist before phase III. Originally its maximum width was 45 ft. but got reduced to 24 ft. in phase IV and was further encroached upon in phase V reducing it to 9 ft. only.

Structural remains of phase III in Block 'G' are very few, but occupation debris and eroded material from mud-brick platforms are however noticed over a considerable area. The damage due to floods was greater in this sector of the Lower Town than in any other

owing to the close proximity of the nullah which used to overflow frequently. Secondly, the general occupation level was lower here than in Block 'A' because of the low plinth of the houses. An eroded platform of mud-bricks assigned to phase IIIa is noticed at the western end of Street 9. A more important structure of phase IIIa is a rectangular burnt-brick altar (96) used for community fire-worship. It was built in SRG 2, D 27-D 28 in Street 9. It measures 9 ft. long and 8 ft. 6 in. wide with an opening in the western arm (pl. XCIIIB). The walls are 1 ft. 9 in. wide and the extant height is one foot. There is a rectangular depression in the southern arm and a semicircular one in the northern arm. These depressions are not accidental, but made deliberately. A posthole, 1 ft. 2 in. in diameter, is also provided in the north-east corner (pl. XCIVA). A large jar of red ware with a 'S'-profile and painted in the characteristic Harappan style with geometric, naturalistic and semi-naturalistic motives all over the surface (pl. CLXVIA) in black over red is found embedded in the soil near the south-east corner of the structure. The fire-altar is too big to be used as an oven and is entirely different in shape from the kilns and furnaces known at any Harappan site. It could not have served the purpose of a bath in the absence of any drain or brick-paved floor. It is too small to be used as a kitchen either. Hence we have to rule out the possibility of this structure having been used as a bath, kiln, furnace or oven. There are certain unique features which must be taken into account before deciding the purpose of its construction. The 'S'-shaped jar noticed near it has its bottom intact and the surface is so tastefully decorated by painting that it could not have been used as a soakage jar. It is a rare specimen of excellent painting in Harappan style. Hence it must have been used for a more important purpose such as keeping sacred water or offerings for religious worship. The post-hole in the north-east corner of the altar was meant for fixing a thick wooden post in it. Other rectangular and semi-circular depressions in the walls were meant for keeping the utensils etc. needed for worship. The gap in the western arm is due to brick-robbing. The contents being ash and terracotra cakes it is surmised that the structure served the purpose of a fire-altar where the public could worship fire.

At the junction of Streets 1 and 9 is situated a house with three rooms. A fire-place visible in it was encroached upon in phase IVb by building a mud-brick house (132) in SRG 2, D 28. The latter is a single-room structure the construction of which resulted in introducing a lane (pl. XCIIIA).

The mud-brick house (151) situated in the western row of houses in Street 1 is referred to here because it extends into Block 'G' and a burnt-brick enclosure similar to the fire-altar (96) is located in one of its rooms (pl. XCVA). The mud-brick platform is covered with a burnt-brick apron against erosion. The said fire-altar built in ten courses of burnt bricks contained a large quantity of ash and burnt earth besides terracotta balls. Except for ritualistic worship of fire there is no other possible use to which the structure could be put. It is too big and unsuited for oven or kiln and there is no trace of any drain or burnt-brick flooring to suggest its use as a bath. A jar placed close to the southern wall was not used as a soakage jar since it has no hole. Moreover the structure is too small to be used as a kitchen. Hence it must have been used for a ritualistic purpose such as the worship of fire.

B. Phase IV

Signs of decline in the standard of construction are clearly visible in phase IVa when a large number of houses had to be built from the debris of ruined houses. No attempt was made to remove the debris or to carry the foundations of the buildings sufficiently deep. The mud-bricks used in the construction were of poor quality, and floors were not paved with bricks. It must however be said to the credit of the residents of Lothal that they still built houses in straight rows and tried to maintain the town clean by introducing soakage jars, but encroachments were made on the streets.

A mud-brick house (159) built at the junction of Streets 1 and 9 is one of the largest in Block 'G' extending into SRG 2, D 24—D 27, E 25—E 26 and F 25—F 27. The walls are raised over a layer of flood-borne debris accumulated in phase IIIb. The front verandah opening into Street 9 is 40 × 16 ft. extending into Street 1 also and is entered from both the Streets. A hall built south of the verandah measures 28 ft. 6 in. × 16 ft. and one of the two rooms facing Street 1 is 15 × 13 ft. (pl. XCII). Chank shells, columella and incompletely worked bangles found in the house indicate that shell-workers lived here.

Lane 1 running east-west and parallel to Street 9 cuts across Street 5. Another large house of phase IV (160) is laid bare on the southern margin of Street 9 in SRG 2, G 26—G 27. It extends upto J 28 and consists of seven rooms covering an area of 1850 sq. ft. (pl. XCVB). The walls vary in thickness from 2 ft. 3 in. to 6 ft. 6 in. The corner room (160c) at the junction of streets 5 and 9 has a large opening. Another opening adjoining it on the south (160a) has an entrance 4 ft. wide.

The internal measurements of the rooms vary from 13 × 14 ft. to 5×6 ft. The main entrance to the house lies at the western end of the northern wall from Street 9 while another entrance in the north-east corner provides access to the house from Street 5. A soakage jar is found embedded in Street 9 close to the burnt-brick pavement for draining off sullage water. Similar soakage jars were used in phase V also. It may be noted here that the cross walls in two rooms do not form perfect right angles with the long walls. This indicates the poor standard of construction. The mud-brick walls of phase IV noticed in SRG 2, H 26 to the west of house 151 on the southern margin of Lane 1 are found to belong to a smithy as suggested by pot-furnaces, crucibles, and slag-dumps but the full extent and plan of the buildings could not be ascertained because structures of phase V are superimposed over them.

C. Phase V

The alignment of Street 9 was changed in phase V (pl. XCII) by encroaching upon it. Mud and mud-brick houses were built on both the sides in utter disregard of the earlier alignment of houses of phase IV which were now covered by flood debris. The foundations of the houses of phase Va are laid in layer 3 and those of phase Vb in layer 2 (pl. XXIV). In all, two houses in the northern row and four in the southern have been laid bare in Street 9. One of them (189), built in SRG 2, D 29 to E 28 in the northern row, has a large cell measuring 21 ft. 6 in. wide. Its full length is not known but it appears to

have extended towards the east. The soakage jar (198) skirted with burnt-bricks along the rim indicating a higher working level belongs to phase Vb (pl. XCVIA), whereas the house (189) with its two mud-brick walls forming a large room belongs to phase Va. The latter encroaches on Street 9. The burnt-brick floor of what appears to be a bath (190) also belongs to phase Vb.

Four houses assignable to phase V are traced in the southern row. One of them (192) with two rooms and a burnt-brick drain is located in SRG 2, H 28—K 28. It is partially traced to an extent of 18 x 36 ft. Another house laid bare in H 25—J 25 and of the same dimension has a mud-brick floor. Both these houses have their foundations laid in the debris layer 3 and the walls are sealed by layer 2 in which the foundations of mud houses (195 and 196) of phase Vb are laid. Other structural remains of phase Va at the western end of the trench, namely remnants of a mud-brick house with one room are encountered in SRG 2, J 27.

The extremely poor standard of construction in phase Vb is reflected by the reed hut (195) with a mud-floor built over the ruins of a house (160) in SRG 2, H 27 (pl. XCVIB). The one-inch wide holes noticed at regular intervals in the mud floor contain remains of burnt reeds. Apparently the mud-plastered walls of reeds must have been destroyed by fire. The floor also bears traces of burnt plaster.

Thus it is evident that there was greater building activity in phases IV and V in Block 'G' than in any other. Layers 2 and 3 have yielded characteristic pottery of Period B. The flood-debris washed away from Block 'A' and deposited in the layers underlying structures of phase IV has yielded sherds of the Reserved Slip Ware as well as the Cream Ware painted in chocolate with wavy lines (pl. CLXXXIVA). The general deterioration in the cultural equipment of Period A as a whole is reflected in the poor construction of houses, lack of planning and civic amenities.

10. THE DOCK

A. Structural Details (figs. 19-20)

A brick-walled structure (pls. XCVII to CXI) enclosing a trapezoid basin laid bare on the eastern margin of the town is the largest burnt-brick construction ever made by the Harappans. Its western embankment wall is 716 ft., the eastern 705 ft. 6 in., the southern 117 ft., and the northern 123 ft. in length. The width of the wall is 6 ft. at the foundation level in the case of the western arm and 5 ft. in other cases. Originally at the top the wall was 3 ft. 6 in. wide, but got reduced to 2 ft. in phase IV. The inner face of the embankment is absolutely vertical on all the sides without any sort of steps or ramp to reach the fluctuating water level (pl. XCVIII). On the other hand, the outer face has three offsets in the case of the western wall and two in other walls to counteract the thrust of water in so vast a basin. The extant height of the wall in the southwest corner of the basin is 11 ft. with 42 courses of bricks. Originally, the walls must have been raised upto the top of the mud-brick platform abutting the western enbankment thus accounting for a total height of 14 ft. including 3 ft. in the foundation, but damage was caused by floods in phases

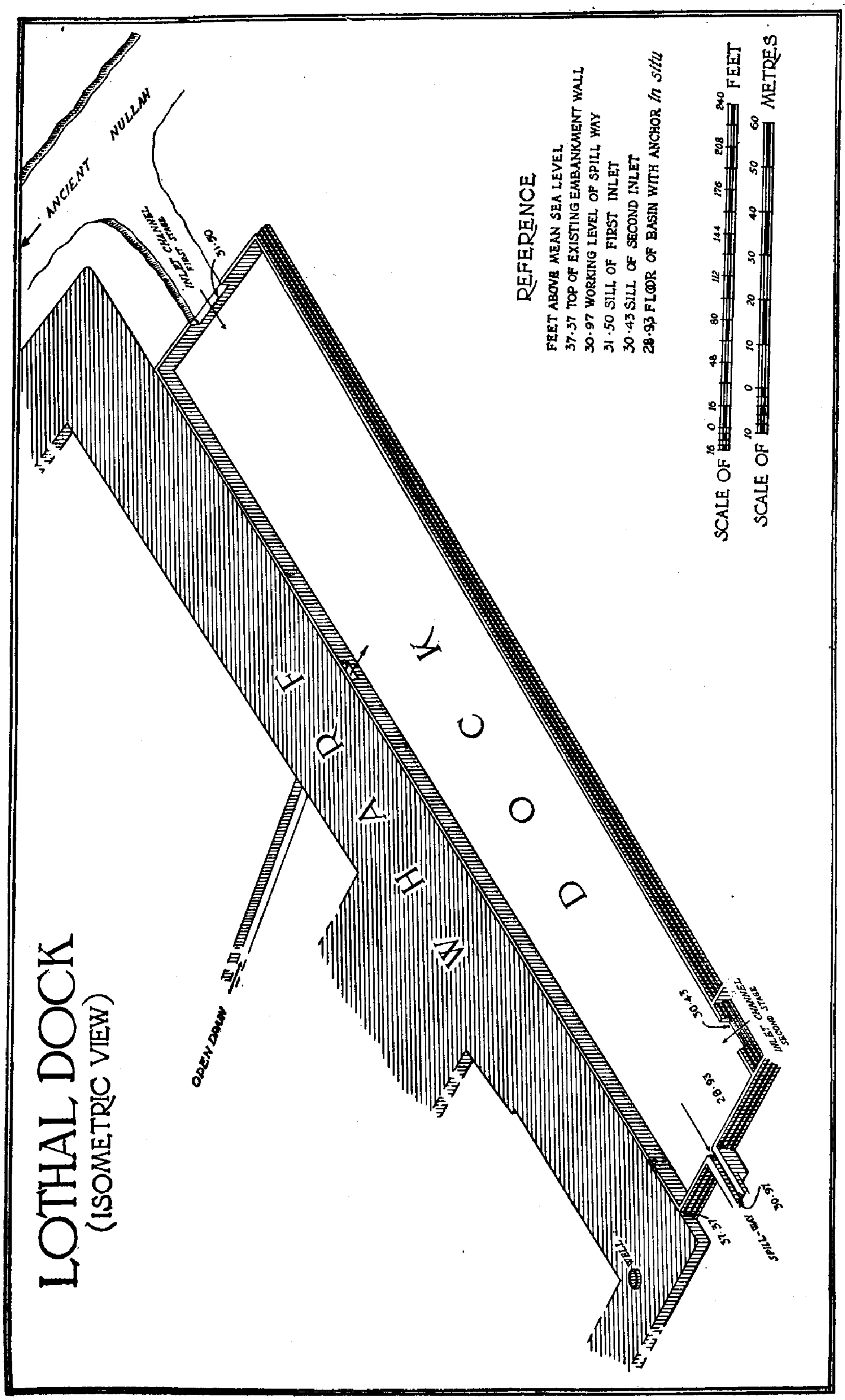

LOTHAL DOCK
(ISOMETRIC VIEW)
ANCIENT NULLAH
INLET CHANNEL FIRST STAGE
31·50
DOCK
WHARF
OPEN DRAIN
30·43
INLET CHANNEL SECOND STAGE
28·93
SPILL-WAY
30·97
37·37
WELL
REFERENCE
FEET ABOVE MEAN SEA LEVEL
37·37 TOP OF EXISTING EMBANKMENT WALL
30·97 WORKING LEVEL OF SPILL WAY
31·50 SILL OF FIRST INLET
30·43 SILL OF SECOND INLET
28·93 FLOOR OF BASIN WITH ANCHOR in situ
SCALE OF FEET
SCALE OF METRES

FIG. 19.

III and IV. Though the original entry for ships was in the northern wall, the shift in the flow-channel of the river necessitated providing a 23 ft. wide inlet in the eastern wall (pl. XCIX) and two projections, 4 ft. 8 in wide, one on either side of the (second stage) inlet (pl. CIA). As explained below these projections seem to be retaining walls of a mud bund flanking the artificial channel connected with the inlet. Sometimes monsoon water enters the dock through the inlet (pl. CIB). A brick-built channel measuring internally 3 ft. 2 in. wide and 5 ft. 6 in. high, joins the southern embankment (pl. CII). Its walls are 5 ft. thick and the vertical recesses provided on either side of the opening are 11 in. wide. At the mouth of the channel, steps, 4 in. wide and 3 in. high, are built (pl. CIIIB). Apparently they are too narrow and the rise is too small to serve the purpose of a flight of steps for men and cattle to get down to the water-level. The foundation of the channel walls is as deep as that of the enbankment wall for a length of 15 ft. Beyond, it is very shallow. A horizontal row of six weep-holes is provided in both arms of the channel at regular intervals of 1 ft. 9 in. (pl. CIVA). In two such weep-holes of the western wall wooden channels were found inserted to serve as outlets for water seeping from behind the walls. The vertical recesses provided at the mouth of the channel were meant for inserting a wooden door tc regulate the outflow of water through the channel which served as a spill-way for the excess water entering the basin at high tide through an inlet in the northern wall in the first stage and through the eastern wall in the second stage. Some postholes are also noticed in the eastern and southern enbankment walls (pl. CVA).

The dock was constructed in *circa* 2350 B.C. in phase IIa and continued to be in good use upto the end of phase IIIb when a great flood in 2000 B.C. caused heavy breaches in the walls. These breaches were mended soon and a public drain which discharged sullage water into the dock through an opening in the western embankment was closed by building up a brick wall. As a sequel to the floods in phase IIIb the flow-channel of the river had changed necessitating thereby digging of a new channel to bring ships into the dock. Thus came into existence in phase IV an inlet in the eastern embankment as the original inlet in the northern wall had ceased to function. Finally, the flood at the end of phase IVb in *circa* 1900 B.C. was of such long duration and great intensity that the entire dock was destroyed along with the township. The damage was very extensive, but no effort was made to commission the dock once again either by desilting the basin or rebuilding the damaged walls.

A layer of debris from the occupation levels of Period A seals the damaged embankment on the western side, more so in its northern half. The northern embankment suffered the heaviest damage in phase IIIb as the flood water rushed through the original inlet (pls. CVB and CVIA). The enormous accumulation of silt and sand in a bowl-like depression clearly indicates the existence of an inlet in the northern embankment. This was traced only after the entire silt within the basin was removed and new cuttings, namely SRG 36, SRG 58 and SRG 61 were made outside the northern embankment in 1960 and 1961.

Owing to heavy erosion of the habitation in phases IV and V a thick layer of debris containing vast quantities of painted pottery and other antiquities including Late Harappan seals and terracottas characteristic of Period B has accumulated over an earlier

debris layer of the mature Harappa Period in the northern half of the basin (pl. CVII). Subsequent annual sheet-flooding has also been responsible for depositing black clay over the Late Harappan deposits. Excepting a few sherds of pottery and stray remnants of brick structures encountered in the northern extremity of the Lower Town no relics of any importance assignable to Period B are seen on the main mound itself. Every significant antiquity seems to have been washed away and deposited into the basin, where successive layers of estuarine shells, silt, pottery of mature Harappa period, fine alluvial silt and habitation debris of Period B finally capped by black clay are met with.

The western embankment wall is better preserved than others owing to the protection it received from the wharf (fig. 19). A mud-brick platform, 800 ft. long and 85 ft. wide, was built abutting the western wall over clay—and kankar-filling. Two drains, one from the Acropolis and another from Block' A' in the Lower Town, are found to pierce the western embankment. They brought in sullage water from the town. But finding that flood water entered the habitation area the inhabitants had to close them in phase IV.

B. Use

The purpose of excavating so vast a basin which measures, on an average, 711 ft. x 121 ft. and enclosing it with 14 ft. high walls of burnt-bricks could not have been anything other than providing berthing facilitates for boats. It has been so designed as to meet the requirements of a dock. An inlet gap (fig. 19), 41 ft. wide, provided in the northern embankment was meant for sluicing ships into the basin at high tide through a nullah flowing along the northern margin of the town (pl. XXXVIII). This gap was not clear enough in the early stage of the excavation owing to limited digging. However, after excavating the entire basin the original inlet is now traceable fairly accurately. Automatic desilting and escape of excess water at high tide were ensured by building a spill-way in the southern embankment. Arrangements also existed for sliding a wooden door in the recesses of a the spill-way which could be closed and the required water level maintained at low water to ensure floatation of boats. The varticality of the inner side of the walls and the absence of a proper approach to the water level in the form of steps or ramp clearly indicate that the structure was meant for berthing boats and there was no need to provide access for man and animals. The bricks are found worn out at a uniform level at which the edges of the ships anchored in the basin touched the embankment wall. The builders of the dock took care to provide a mud-brick platform, 800 ft. long and 64 to 72 ft. wide, adjoining the western bank for easy hauling of the cargo.

It must also be remembered that a warehouse was built close to the wharf with a view to examine and seal the cargo. Loaded ships could easily enter through the inlet gap of the first stage in the northern wall as also through the inlet gap of the second stage in the eastern wall. Floatation of ships was ensured at low water by blocking the spill-way for retaining the necessary water level. At high tide, there was a flow of 7 to 8 feet of water above the sill of the inlet in phases II and III, and at least 6 to 7 ft. in phase IV. The position of the anchor stone found *in situ* on the floor (pl. CVIIIA) of the basin clearly indicates displacement of 8 ft. water when the embankment walls stood 14 ft. high (above p. 123.)

C. Tradition

It is interesting to find that even today the villagers consider Lothal a seat of worship of *Vānuvatīmātā*, the sea-goddess, and significantly enough, some stones representing the goddess were found on the warehouse platform overlooking the dock. There are several shrines dedicated to *Vānutīmātā* along the Gujarat coast near ancient ports such as Gogha, Broach and Surat, where Late Harappan sites are located. It is customary to offer cocoanuts etc. to the goddess before setting sail and after landing at the port. According to local tradition, about 100 years ago, Lothal was a port and boats used to be anchored in the backwaters which extended upto the mound. All that is seen at present is a tank which formed part of the creek. *Vānuvatīmāta* would not have found a place on the warehouse mound had not Lothal been a port in ancient times.

D. Evidences for Dock

Another point to be borne in mind is that kiln-fired bricks which were too precious to be used even in the construction of important residential buildings in the Acropolis would not have been wasted in millions on the construction of the embankment of a tank for storing potable water. An earthen bund would have served the purpose. The absence of steps or ramps for easy approach to the water level goes against the suggestion made by some scholars that the trapezoid structure was a tank. They express doubt as to whether an arm of the sea extended upto Lothal. The occurrence of estuarine shells in the basin and the extraordinary salinity of the silt from the dock as compared with that of the soil outside indicate that sea-water reached the dock four thousand years ago through the river estuary. At present the sea is more than ten miles away from Lothal and some of the creeks are silted up during the last several centuries.

(i) *Expert opinion*

Archaeological evidence apart, it was found desirable to obtain the report of a competent authority who could say whether the structure was designed for a dock and whether boats could have reached Lothal from the Gulf of Cambay four thousand years ago. The report of Sri H. P. Oza, Director of Ports, Gujarat State, who examined the structure is reproduced in full below:

"My visit to Lothal on 1-12-1960 was for the investigation of this dockyard. During the visit excavation was in progress and it was found that to the east of the dock yard was a channel which could have been an approach from the sea to the dock yard. Excavation is in progress and we should be having more evidence of a sea approach channel.

Reference is invited to survey of India quarter inch sheet (No. 46B Fifth edition). We find there a depression, beginning west of Saragwala, passing south upto Samani also on west, turning eastward to Bholad and then to south-east to Buranpur and then to eastward joining ultimately the sea. The river Bhogawa joins this depression somewhere near Bholad.

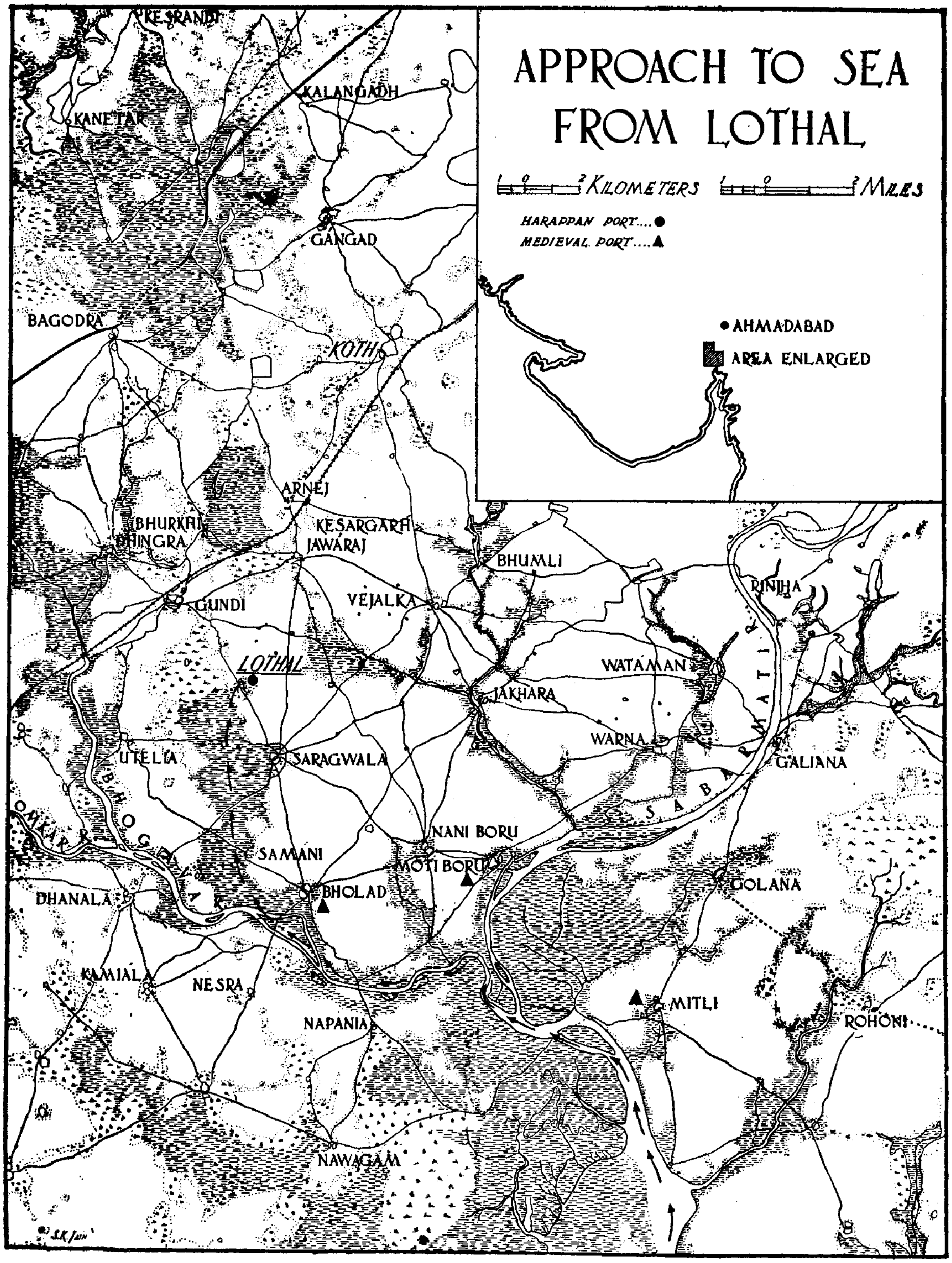

APPROACH TO SEA FROM LOTHAL
KILOMETERS
MILES
HARAPPAN PORT....●
MEDIEVAL PORT....▲
AHMADABAD
AREA ENLARGED
KALANGADH
KANETAR
GANGAD
BAGODRA
KOTH
ARNEJ
BHURKHI
DHINGRA
KESARGARH
JAWARAJ
BHUMLI
GUNDI
VEJALKA
RINJHA
LOTHAL
WATAMAN
JAKHARA
WARNA
UTELIA
SARAGWALA
GALIANA
SABARMATI R.
BHOGAVA R.
ONKAR R.
NANI BORU
SAMANI
MOTI BORU
BHOLAD
GOLANA
DHANALA
KAMIALA
NESRA
MITLI
NAPANIA
ROHONI
NAWAGAM

Fig. 20

In the Gulf of Cambay there is enormous quantity of silt and also a strong tidal current. But the main current is north-south. This has resulted in East-west narrowing of the Gulf, and some recession of the sea from North and channels and creeks have relatively silted up fast. Our experience of Bhavanagar creek, Sonai creek and Dholera creek clearly shows that once the flow regime is altered the siltation is very quick. Almost upto recent past Bhavanagar Kalubha creek was navigable upto Vallabhipur but there is such a rapid siltation that in near future one may even find Bhavanagar Bunder (Steel Jetty) out of commission. It is therefore consistent to conclude on the basis of topo sheet and our experience, that *a sea passage to Lothal approachable at high tide existed.*

This leads to dockyard. It is customary to handle cargo on the banks of the channel—on the slopes-or in a prosperous society, to construct a dock. A dock is an artificial enclosure for receiving shippings. It is built not in the stream but having an entrance from it. *At Lothal walls are suitable as dock walls.*

The trapezoid brick-walled enclosure could not be meant for storing potable water. The inside face of the wall otherwise would have been sloping with steps. *The alternative is that an artificial enclosure was constructed for shipping for comfortable working of cargo and safety of boats.*

The question is if the dock was so constructed as to permit boats to enter at high tide over the entrance sill and retain a depth of water in the dock at low water below the sill. If the dock were so constructed there should have been some brick construction to take care of likely erosion. On the other hand if the dock was purely tidal, that is the one which did not ensure any floatation to boats at a low water, there should be abutments to the wall at the entrance of the dock. Again in a well designed dock the entrance will be provided in the shorter arm of the dock and therefore, in case of Lothal, in the north or in the south in preference to in the East. It does not mean that an entrance in the east will make the dock inoperative; it will restrict the length of the boats, also reduce the number of boats which can simultaneously be berthed and make manoeuvring difficult.

There is a narrow opening in the south, with brick masonry and steps falling towards the dock and perpendicular recesses probably for shutters. This is more likely to be an intake channel either for recouping water in the dock or discharge of local drain".

Oza's report clearly says that a sea passage to Lothal approachable at high tide existed (fig. 20) and the trapezoid brick-walled enclosure could not be meant for storing potable water. The walls of the basin are said to be suitable as dock walls. Hence the trapezoid structure could not have been built for any other purpose than serving as a dock.

(ii) *Inlet-channel (2nd Stage)*

The excavation was still in progress on the eastern side of the dock when Sri Oza examined the structure. Subsequently the inlet-channel (approach channel) was traced over a length of one mile extending eastwards from the entrance sill upto the river bed which is noticed near the recently constructed road connecting Jawaraj with Saragwala. The silted-up channel of the inlet can be seen in cutting SRG 19 with the dock in the background (pl. CVIIIB). Further eastward another section across it in SRG 46 has revealed successive deposits of gravel, alluvial silt and sand in a bowl-like cutting (pl. CIX). A deep cutting is noticed in SRG 53 near the Jawaraj-Saragwala road (pl. CXA) where the flow-channel of the river in the second stage is traced. The inlet channel is 23 ft-wide for nearly half a mile from the inlet gap gradually widening towards the river on the east. A thin deposit of gravel and estuarine shells noticed underlying fine sand and silt in the bed

of the channel suggests that the tidal waters reached the dock in the second stage through the new flow-channel on the east.

(iii) *River-bed (first stage)*

It was also observed that in the cutting SRG 43 made on the Gundi-Saragwala road, a 6 to 8 ft.-thick deposit of fine alluvial silt had accumulated in a bowl-like depression. F.E. Zeuner who examined the cutting was of the opinion that this silting was not due to normal floods but the result of an abnormal one. On his suggestion deeper digging was undertaken in SRG 43 and the trench was extended eastwards as a result of which the original flow-channel of the river could be traced on the western fringes of the mound. Silt-rock was found to underlie a 2 ft.-thick deposit of coarse gravel (pl. XXIIIB) which yielded typical Harappan pottery painted in black over red along with beads and chert blades. The ceramic and stratigraphical evidences confirm that the river used to flow very close to the Lothal mound in phases I to III. The sudden silting up of its original flow-channel must have taken place at the end of phase IIIb. Simultaneous excavation in the river bed and the central part of the town revealed a thick deposit of silt in SRG 2, D 13—D 14, and E 13—E 14, sealing the flood-damaged structures of phase III and confirming thereby that the town was destroyed by a great flood at the end of phase IIIb. The correlation of the levels of the flow-channels of the river in phase III on the west and in phase IV on the east with the levels of the inlet-channel and entrance-sill in the eastern embankment has emphasized two points. First, the flow-channel of the river in the early stages of occupation i.e., phases I to III, lay close to the western margin of the mound. Secondly, the river suddenly changed its course and began flowing one mile east of Lothal as a sequel to the great flood at the end of Phase IIIb. This necessitated providing an access to the boats from the new flow channel of the river to the dock by digging an artificial inlet channel in phase IV. The channel traced in SRG 19, SRG 46 and SRG 53 can easily take country crafts of 60 tons displacement

(iv) *Nullah and the first inlet*

A burnt-brick wall, 4 ft. 2 in. wide and identical in construction and other details with the embankment walls of the dock, was traced with breaches here and there (pl. XIB) in SRG 59 and SRG 2 over a length 45 ft. Some trial pits sunk at right angle to the brick wall revealed a bowl-like depression at the bottom of which lay a gravel deposit capped by silt and fine sand (pl. XIA) as in the case of the flow channels of the river. A few feet away from the northern wall of the dock a similar depression was noticed in SRG 58 (pl. CXB). It was therefore obvious that a rivulet or nullah once flowing along the northern margin of the town joined the river flowing on the western margin of the mound. This is indicated by a continuous depression also. As a precaution against inundation, a burnt brick wall was built in phase IIa over a mud-bund of phase I on the northern fringe of the Lower Town. This structure is supported by two abutment walls on the inner face to prevent

damage by floods in the nullah. The occurrence of an anchor stone on the wall in which a posthole could also be traced and the designing of the wall for berthing boats suggest that the nullah flowing in the east-west direction served the purpose of an approach-channel from the river to the dock in the first stage and that boats were at times anchored in the nullah before they could find entry into the dock.

The section across the channel revealed in the cutting SRG 58 (pl. IV) shows a clear bowl-like depression north of the inlet gap in the northern wall of the dock. This 41 ft.-wide artificial channel running north-south connects the nullah with the dock. A gap in the central part of the northern embankment wall and also the sill of the first-stage inlet can be seen in pls. CVB & CVIA. Hence it is fairly clear that there existed a 41 ft.-wide inlet to allow entry of boats in the shorter arm of the dock to make manouvering easy. Some brick constructions noticed in the north-west and north-east corners outside the embankment walls in SRG 17 and SRG 58 respectively seem to be remnants of quarters of dock-workers or inns on the water front. Originally the dock was so designed as to ensure berthing space for at least 20 to 30 boats of a fairly large size. The provision of a posthole in the brick wall near the northern end of the mound and the presence of an anchor-stone here suggest that boats awaiting entry into the dock were moored for sometime in the nullah.

The evidences adduced here clearly show that Lothal was a port and the trapezoidal brick-built structure was used as a dock for proper berthing of ships and hauling of cargo in phases II and III, while in phase I the boats were moored along the quay of the river and the western margin of the peripheral mud bund. That an arm of the sea reached Lothal is evident from the depression extending from Bholad and Samani via Saragwala upto Gundi (fig. 20). The river joined the creek somewhere between Bholad and Laxmi-pura. To sum up, the circumstantial evidences such as the verticality of the face of the embankment walls, the absence of steps or ramp to approach the fluctuating water level in the basin, the extreme salinity of the soil inside the dock and the occurrence of estuarine shells suggest that the structure was not meant for storing potable water, but for providing anchorage and hauling facilities for ships. The inhabitants would not have built such a large basin and allow saline water to be stored for any purpose other than berthing ships. The discovery of the original flow-channel of the river close to Lothal town has also answered the query as to why the Harappans built a dock almost a mile away from the present river-channel near the Jawaraj—Saragwala road. It may be noted here that originally the river was flowing within 500 yards of the dock and the ships entered the inlet channel connecting the nullah. The suspicion of Oza that the entry in a well-designed dock should be in the longer arm is also confirmed by the discovery of a 41 ft.-wide opening in the northern arm. The spill-way in the opposite (southern) arm, when kept open, helped automatic desilting and escape of excess water at high water, while, at low water, it could be closed to retain enough water to ensure floatation of ships. The sill of the spill-way is 30.97 ft. above the M.S.L., whereas the sill of the inlet of the first stage in the northern arm is 33.50 ft. above the M.S.L. The inlet gap in the eastern wall is only 23 ft. wide and the sill is 32.43 ft. above the M.S.L. The spill-way was kept lower than the sill of the inlet in both the stages to ensure automatic desilting. When the spillway is closed a minimum column

of 8 ft. of water was available in the basin at Lothal for movement of ships. The channel of the second stage is not more than 5 to 6 ft. deep anywhere, whereas the earlier inlet channel was wider and deeper enabling larger ships to enter the dock. Apparently fewer and smaller boats entered the Lothal dock at high tide in phase IV through the shallow inlet channel.

A general view of the dock in the monsoon (pl. CXIB) gives an idea as to how water could enter the basin during high tides.

(v) *Anchor stones and boats*

The last shred of doubt regarding the use of the brick-walled trapezoid basin as a dock was removed by the discovery of five anchorstones, three on the floor of the basin and two elsewhere. They are perforated right across and the shallow grooves on the surface indicate use of ropes with which they were tied. That the Lothal folk had a sound knowledge of constructing boats can be made out from the miniature terracotta models of boats recovered in the excavations in the habitation area. Three types of boats can be made out from them. The first type is heavy and its prow is pointed while the stern is broad. There are four holes, one near the prow, another away from the stern and one each on either margin. The hole near the stern was meant for fixing the mast (pl. XCIA), and the one near the prow for towing or securing the sails. The other two were meant for pegs to rest the oars on them. The second type is a light flat-bottomed barge-like boat without any provision for sail. It is wide in the centre and the prow is pointed. As the other half of the model of the boat is broken it is not possible to know what the stern was like. This type must have been used on the rivers and for loading and unloading large ships which could not enter the dock in phase IV. The third type is a heavy boat with a thick broad stern. The prow must have been pointed as it is found to be narrowing towards the opposite end. There is yet another model which is very narrow but long, almost similar to the catamarons of South India used mostly as fishing boats near the coast. It was perhaps a dug-out. Sometimes as many as thirty oars appear to have been used for rowing boats on the river or close to the coast. In this connection a potsherd of Micaceous Red Ware painted with two boats (pl. CLXXVA) and having multiple oars may be mentioned. The wavy lines below them indicate water.

Another potsherd from Lothal painted with a large fish or whale below a group of wavy lines bound by horizontal bands (pl. CLXXIA) suggest that Lothal folk had knowledge of animals in deep sea.

The levels of the spill-way, inlets, embankment walls, basin, inlet-channel and river are given below.

E. Levels and Displacement

1.	Bench mark of the Government Trigonometrical Survey at Lothal mound	53 ft. above M.S.L.
2.	Highest point on the mound ..	55.52 ft. ,,

3.	The present G.L. in SRG 3 above the spill-way of the dock	40.97 ft.	above M.S.L.
4.	Top of the existing brick wall in the south-west corner of the dock	37.37 ft.	,,
5.	The working level of the spill-way (topmost step) when open	30.97 ft.	,,
6.	Sill of the inlet (first stage) in the northern embankment (opposite spill-way)	31.50 ft.	above ,,
7.	Sill of the inlet (second stage) in the eastern embankment)	30.43 ft.	,,
8.	First offset in the western wall (the original floor of the basin)	28.35 ft.	,,
9.	Floor of the basin on which the anchorstone was found *in situ*	28.93 ft.	,,
10.	River bed (first stage) where silt-rock was encountered on the slope	26.45 ft.	,,

Draught

11.	Maximum depth of water in the basin calculated at the present height of the embankment wall in the south-west corner	9.02 ft.	,,
12.	Maximum depth of water at high tide when the height of the enbankment wall was 13. ft. 6 ins.	11.00 ft.	,,
13.	Minimum draught at low water taking 1 ft. water above the sill of the inlet	4.15 ft.	,,

F. Ancient Dock at Goha

For a comparative study of the construction of docks in ancient times Hathab, an early historical site referred to by Ptolemy and identified as the ancient *Hastabra* is a good example. It is situated within a distance of two miles from Gogha which must have been a very ancient port (fig. 3). Nearby is an early historical site, but some sherds of Late Harappa Ware are also found here. At present country crafts are moored in the creek which has been partly closed by two stone masonry walls and another is under construction. The boats enter and leave the basin at high tide, but get stuck up in low water (pl. CXIIA). There is a sluice gate in the shorter arm opposite the entrance to allow excess water to escape (pl. CXIIB), but it is always kept open so as to ensure automatic desilting. Although the dock at Goha is less than half the length of the Lothal dock and only one-quarter of its width, it closely resembles the Lothal dock in working. Originally the ships entered the Lothal dock through an inlet in the shorter arm, but in Gogha the creek itself is made use of for entry through the shorter side. Whereas the Lothal dock is enclosed by brick walls and allows flotation at low water, the Gogha dock had mud-bunds but, they are now revetted by stone walls. The Lothal dock is larger and better dsigned for manouvering and accommodating more number of boats than is possible in the dock at Gogha, which is only 40 ft. wide at the mouth and 30 ft. in the centre. In constructing a long wharf and introducing water-locking device, besides an artificial inlet, the Harappans have shown superiority in marine engineering over their successors at Gogha. It is

observed that boats even when loaded as much as 47 tons are able to float in 4 feet deep water at Gogha. It is therefore no wonder if boats of this size could enter Lothal dock in the second stage through a channel, 6 ft. deep. The country crafts plying between Gogha and Bombay and carrying merchandise are found to be 65 ft. in extreme length, 14 ft. in breadth and 7 ft. deep. At least twentyfive boats of this size could be easily berthed simultaneously in the Lothal dock. It is further understood that even when the high tide is as much as 37 ft. at Gogha, the maximum depth of water allowed in the basin is 12 ft., but floatation of loaded boats is possible in 5 to 6 ft. deep water. Lothal dock could ensure a 10 ft. column of water at high water and about 5 ft. at low water.

L. S. Leshnik in his article "The Harappan Port at Lothal" (*in American Anthropologist* Vol. 70, 1968, pp. 911-922) has misrepresented certain basic facts about Lothal and its dockyard with the sole purpose of belittling the achievements of the Harappans in building a well-planned town and the earliest dockyard of the world. In this connection it would be appropriate to know what Prof. Sankalia has to say (*Pehistory and Protohistory of India and Pakistan*, Poona, 1974, p. 374) "Though Leshnik accepts the fact that some 4500 years ago the sea might have been very near Lothal, because he thinks that the place was at the most a large village, it could not have been a port. This view is certainly wrong, from what we know of early towns and cities in India and outside, and from the vaious criteria that culture-historians have prescribed for an ancient site as a town or a city. A city in the strict sense, it was probably not, but a town it was with its three monumental buildings, three large streets, a bead factory, a seperate cemetery and evidence of the knowledge of writing besides rich and varied finds. One has yet to see such a well-laid out, "literate" village in India or outside. Leshnik's outlook is initially vitiated and prejudiced and therefore he refuses to regard Lothal as a port though he concedes its proximity to the sea." His statement that the dockyard was a tank should be viewed against this background. If the structure were to serve as a tank, one side must be kept completely open for entry of rain water from the catchment area, but this is not provided for in the present case. Secondly, the saline water stored from the very beginning could not have been used for irrigation purpose. Thirdly, as Sankalia has pointed, the use of small stones as counterweights of shadufs in lift-irrigation is confined to narrow-mouthed wells. The enquiries have revealed that they are not used in tanks. Three types of anchors have been found at Lothal. Leshnik has not taken into account the fact that the larger ones, 22 to 28 inches in diameter, found here cannot be used as weights in shadufs. Lastly, he has confused the issue when he says that the inlet of second stage (22 feet wide) is too large to bear the pressure of tides. There was no direct tidal wave from the sea or creek to the dock in this stage. The boats entered the dock through a channel connected with the river which was one mile away. Even now one can see boats moving in shallow channels near Moti Boru.

G. The Sea-Goddess

It was observed at Gogha that a *triśūla* (trident) representing *Vānuvatīmātā* is painted on the inner face of the prow and offerings are made to the goddess before the boats set

sail and also on safe landing. This goddess is also called *Vānuvatī Sikotarīmātā*. The suffix *Sikotarīmātā* appears to have been added in the early historical period when Indian merchants settled on the north coast of Socotra, an island off the East African coast. The author of the *Periplus* mentions Hindu ships plying off East African, Arabian and Persian ports. Temples dedicated to *Vānuvatī Sikotarīmātā* are situated at Kuda near Gogha and near the Hajira about 20 miles from Surat. Small mounds named after *Sikotarī mātā* are seen in the salt-wastes of the Gulf of Cambay and in the Rann of Kutch where crudely carved stones representing sea goddess are worshipped even now. The sites named *Sikotarī (mātā)* on the Survey of India maps (1″) are listed below:

		Nearest village
72°23'E	22°19'N	Wadgam
72°22'E	22°25'N	Mitli

These and other sites named after *Sikotarī mātā* were ports of call for small ships from the first few centuries of the Christian era almost upto modern times. They must have been more important in the pre-christan era. Recently, however, they have been silted up. *Vānuvatīmātā* is worshipped at Nani Boru near Lothal which was also a small port two centuries ago. Boats call at Moti Boru occasionally, but both the *borus,* meaning ports, are out of commission now. *Vāṇ* or *Vāṇu,* a corrupt form of *Vāhan* in Gujarati, means a boat, and *Vāṇuvatīmātā* refers to sea goddess. The word *Sikotarī* conveys a vulgar meaning in modern Gujarati. Originally, the reference may be to the goddess protecting Socotra. Folk songs eulogising *Vāṇuvatīmātā* are sung in Kathiawar by some of the folk dancers even to this day. According to tradition there were seven *Vāṇuvatīmātas* of which only five, namely one each at Nakhtrana in Kutch, Vanu in the Little Rann, Kuda near Gogha, Lothal, and Hajira near Surat are still worshipped. *Vāṇuvatīmātā* is said to have come from Sind, suggesting thereby that the Harappans sailed to different parts of their empire from sind. It appears that the sites where *Vāṇuvatīmātā* is worshipped were ports of call in Harappan and later times.

H. PERIPHERAL WALL

Harappan towns were invariably skirted by a mud-brick wall, and Lothal was no exception to it.

While rebuilding the town in phase IIa great care was taken to protect the Acropolis including the warehouse and ruler's mansion against recurring floods by strengthening the peripheral mud wall. This was achieved by raising the height of the wall by 3 ft after filling the breaches caused by the first flood with mud bricks (pl. CXIIIA). However, the total height of the peripheral wall was at no time more than 6 ft. on the sourthern side and 8 ft. on the eastern side. The width varied from 42 ft. on the south to 72 ft. on the east where it served the double purpose of a wharf for the dock and the loading platform for the warehouse. After closely following the warehouse platform on the south and the wharf

on the east, the peripheral wall takes a turn to the north. It does not follow the western margin of the warehouse. On the other hand, the southern arm continues westwards to enclose Block 'D' (pl. XXXVIII). Entry into the town was provided by an opening in the southern arm of the peripheral platform in SRG 32 at its junction with the western arm of the Acropolis. No gateway or corner tower or sailent is encountered anywhere. It is a simple opening which permitted vehicular and pedestrian traffic into the enclosure. One had to go up the ramp to reach the ruler's residence in Block 'B', the warehouse (Block 'C') and Block 'D' .The interspace between the warehouse-platform and the peripheral walls varying in width from 16 to 28 ft. was rammed with kankar (pl. CXIIIB). At Mohenjo-daro, Harappa and Kalibangan also the citadel is said to have been enclosed by a defensive wall of mud-bricks with burnt-brick revetment. Gateways and towers have been identified in these cities. It is possible that these mud-brick walls were, also anti-flood bolsters. The enormous rate at which the Indus river silted up its basin endangered the safety of Harappa and Mohenjo-daro necessitating such constructions. A careful examination of the section across the western 'defences' of the citadel (Mound AB) at HP XXX reveals that the houses were built within the citadel wall on an elevated ground almost in level with the summit as is done in Bock 'B' of the Acropolis at Lothal (pl. X). The batter provided on the back of the mud-brick platform at Lothal (14a and b) reminds us of similar arrangements at Harappa. Apparently all important buildings were built at Harappa, Mohenjo-daro and Lothal on massive platforms of mud-bricks and mud, which were further enclosed by peripheral mud bunds or platforms. These peripheral platforms were raised in height and reinforced with brick work whenever the floods damaged them. At least at Lothal the peripheral mud-bund superimposed by a brick wall was not meant to be a defensive wall against enemies but an anti-flood measure. The main public drain serving the Acropolis runs over the southern arm of the peripheral wall (pl. XXXB) and discharges water into a cess-pool built at the foot of the platform. Even at Harappa, it is observed, that the wall did not rise much above the working level within the citadel itself, as the main object of constructing the mud-brick wall appears to be the achievement of a certain height above the normal flood level.

A batter was provided on the outer face of the northern and western arms of the peripheral wall at Lothal as they stood higher than the other two sides. A drain runs along the northern arm and a street along the western arm connecting the Lower Town with the Acropolis. A mud-brick platform assignable to phase IIa and rebuilt in phase III was noticed in SRG 6 (pl. LXXXIVA) cut into the southwest corner of the mound and another was laid bare in SRG 2, V 28-W28 in the northwest corner of the town. On the northern margin of the Lower Town a burnt-brick wall (pl. CXCV) similar in construction to the brick embankment of the dock is found to have been built over the eroded face of the mud bund in phase II. It is duly buttressed on the inner face against thrust by water.

A well, . 8. ft. in diameter internally, has been exposed to a depth of 12 ft. in the southeast corner of the peripheral platform (pl. XXVA), and further digging was stopped as water-level was reached.

The entire town was thus enclosed by a peripheral mud bund in phase I which was reinforced in phase II by a mud-brick wall.

CHAPTER VIII

THE CEMETERY

1. LOCATION

The cemetery at Lothal was discovered as a result of a systematic search undertaken in 1958 by probing the western periphery of the mound. The clue to its location was provided by the fragmentary human bones found here. The first grave pit found disturbed by ploughing and erosion contained a few parts of a human skeleton. The second grave however turned out to be extremely important because of the presence of two skeletons (pl. CXVII) suggesting thereby a unique funerary practice hitherto unknown. On confrimation of the existence of a Harappan cemetery at Lothal new grids were excavated in 1959 incorporating the earlier trial-pits (pl. CXV). During the years 1959 and 1960 as many as twelve graves were opened up in the cutting SRG 8 covering almost the whole of the cemetery area identified so far. While trying to connect stratigraphically the habitation area with the cemetery by extending SRG 2 westwards, two graves, each containing two bodies, were encountered, thus confirming that joint burial was not accidental but an important socio-religious custom.

The farthest limits of the cemetery were determined by sinking another trench, namely SRG 26, in the northwest corner of the mound. In the course of the digging a grave containing a body laid east-west was encountered. The cemetery delimited by SRG 26 on the northwest and square W 28 of SRG 2 on the east measures 130×100 ft. Continuous erosion has been responsible for the removal of the soil-covering so much so that some of the graves appear almost on surface. In all, twenty graves belonging to three burial phases equated to the structural phases III, IV and V have been traced within a maximum deposit of 5 ft. In sixteen graves the pit lines could be made out and are numbered 1 to 16. The remaining four also contained fragmentary bones and potsherds, but the pit-lines were not clear. They are designated A,B,C and D. Four graves are assigned to phase III, seven to phase IV, and five to phase V. The skeletal remains including those from pits A to D belong to twentyone individuals. Associated with skeleton 5 are bones of two other individuals. In grave 13, bones of another individual besides skeleton no. 16 were found. Three regular joint burials were noticed in graves 2, 7 and 11 and each of them contained two skeletons. In all, 19 skeletons were sent to the Anthropological Survey of India for examination and report. At first they were examined by Shri B. K. Chatterjee and Shri G. D. Kumar and subsequently by Prof. S.S. Sarkar whose report forms Chapter X of this book.

2. BURIALS AND STRUCTURAL PHASES

TABLE II

Skeleton no.	Locus	Grave no.	Layer sealing grave pit	Cultural phase	Structural period	Dimensions of the grave pit
1	SRG 8 B 1	Gr. 1	1	B	V	7′×2′6″×1′
2 & 3	SRG 8 B 1	Gr. 2	3	A	III	8′×3′6″×1′2″
4	SRG 8 B 1	Gr. 3	3	A	III	7′×2′6″×0′10″
5	SRG 8 D 1	Gr. 4	1	B	V	6′×2′6″×1′0″
6	SRG 8 D 1	Gr. 5	1	B	V	7′3″×2′6″×1′0″
7	SRG 8 D 1	Gr. 6	2	A	IV	6′6″×4′0″×0″10″
8 & 9	SRG 2 W 28	Gr. 7	3	A	III	8′0″×2′9″×1′3″
10	SRG 8 B 2	Gr. 8	1A	A	IVB	7′4″×2′6″×1′0″
11	SRG 8 B 1	Gr. 9	1	A	IVA	9′0″×3′3″×1′6″
12	SRG 8 B 2	Gr. 10	1	B	V	6′0″×2′6″×9″
13 & 14	SRG 2 Y-28 Z-28	Gr. 11	2	A	III	7′×4′×10″
15	SRG 8 E 2	Gr. 12	2	A	IV	5′×3′×1′
16	SRG 8 E 2	Gr. 13	2	A	IVB	8′×4′×10″
17	SRG 8 C 2	Gr. 14	2A	A	IVA	10′×4′3″×1′
18	SRG 26	Gr. 15	2	B	V	7′×2′6″×9″
19	SRG 8 C 3	Gr. 16	2	A	IV	7′9″×3′9″×10″

3. STRATA (Pl. XXIV).

The northwestern part of the mound, where the cemetery is situated, is heavily eroded during the last three thousand years owing to sheet-flooding and agricultural opera-

tions, as a result of which the burials in the upper levels belonging to phases IV and V have suffered most. The poor soil-covering, which is less than 3 to 4 inches in some graves, causes doubts as to the age and true nature of the burials. Fortunately the stratigraphic and ceramic evidences have removed these doubts.

Out of sixteen graves excavated thirteen contained one skeleton each and three contained two each. Two other stray skeletons were found in the cemetery area thus bringing the total number to twentyone. The strata consist of a loose grey deposit, kankar and silt. Below the surface humus comprising kankar nodules, loose ashy-grey earth, i.e. layer 1A, seals grave pit 8 of phase IV, while graves 1, 4, 5 and 10 assignable to phase V are sealed by layer 1 (pl. XXIV). The succeeding layer 2 consisting of loose kankar with patches of blackish clay slopes from east to west and varies in thickness from 6 in. to 1 ft., the fall being as much as 1 in 25. Rolled potsherds of the mature Harappa Civilization encountered in this layer mark the end of Period A, while the late Harappan pottery occurring in layer 1A helps to assign the later burials to Period B. A thin deposit of silt is noticed in layer 2A which seals the graves 9 and 14 assignable to phase IV. Layer 3 is a compact deposit of kankar and blackish silt in which the graves of phase IV are found to have been dug. Graves 2, 3, and 7 assigned to phase III are cut into layer 3A and sealed by layer 3. Layer 4 consisting of silt and alternate bands of fine sand underlies graves of phase III, but no grave is laid in it. Potsherds and brick-bats were, however, noticed in layers 1 to 4. The cemetery was stratigraphically connected with the habitation area, and layers 4 and 5 underlying a joint burial in SRG 2, W 28 were equated to layers 6 and 7 in H 28, I 28 and C 25 of Block G. Layers 6 and 7 in H 28, D 28 and C 25 are earlier than the structural remains of phase IV, but contemporary with the structures of phase III. Hence the earliest burial having its grave pit cut into layer 3A and sealed by layer 3 in SRG 2, W 28 and SRG 8, B 1 should be assigned to the structural phase III. The pottery from the later graves is inferior in composition and surface treatment to the pottery of phase IV. The inferior earthenwares found with skeleton nos. 6 and 16 belong to the late Harappa period as can be made out from the ceramic forms such as the high-necked jar and *lota*-shaped vessels. They are painted with wavy lines and loops in light black over red as in the case of pottery of Period B from the habitation area. On the other hand, the pottery from graves 9 and 14, which consists of the dish-on-stand, jar and basin characteristic of mature Harappa Civilization, is assignable to Period A. No pottery was found with any burial of phase III. So far, burials of phases II and III have not been noticed.

To the east of the cemetery a mud-brick house (193A) assignable to phase V was laid bare in layer 3 corresponding to layer 1A of SRG 2, W 28 of the cemetery and it extends further west also. Layers 6 and 7, which are contemporary with the mud-brick structure (93) of phase IIIa in SRG 2, C 26—C 27 in Block 'A', are equated with layers 3A, 3 and 5 in SRG 2, W 28. The structure (192) laid bare in layer 3 in SRG 2, H 28—J 28 (pl. XCII,) is assignable to phase V. It is however difficult to say whether grave 7 laid in layer 3A belongs to phase IIIa or IIIb. Presuming that level decides the age of an antiquity Prof.

Sarkar thinks that 2 and 3 are of the same period, and adds that skeletons 13 and 14 may not be true burials. As erosion has removed most of the earth-covering, the graves appear in quick succession and are true burials.

4. BURIAL PRACTICES

A. Lothal

Extended burial was common at Lothal as in other Harappan sites, and there is no clear evidence for fractional burials. The crania and a few other parts of skeletons are missing in some of the graves due to the disturbance caused by erosion and ploughing. Grave furniture is generally poor, the maximum number of vessels found in any single burial being five only. Normally, the grave pits measure 8 ft. × 3 ft. 6 in. × 1 ft. 6 in. in the case of joint burials and 7 ft. × 2 ft. 6 in. × 1 ft. to 1 ft. 6 in. in the case of single burials. In rare cases they are wider for accommodating grave goods. The orientation of the body was normally north-south and it was placed fully extended with head to the north, slightly raised and tilted towards the east. Both the arms were kept pressed against the body which usually lay on its back. In very few cases it was placed on its side. The legs were slightly flexed sideways and kept apart, but the feet touched each other. After depositing the body and grave goods the pit was filled with kankar over which earth was piled up rising in some cases above the then ground level. The only instance of lining the grave-pit with mud bricks internally, forming almost a structural coffin (pl. CXX A) as in the case of the Nal cemetery, is a joint burial in grave 7. Elsewhere, for example at Damb Buthi, the bodies were placed in continuous rectangular stone-built chambers measuring 5 × 8 ft., which, according to some, were abandoned dwellings. At Harappa traces of a wooden coffin with lid have been found in one of the graves in Cemetery R 37[1], but in Lothal no coffin of wood or covering of bricks was encountered. The grave pits were normally shallow and just wide enough to place the body, but grave pit 14 is wider at the southern end and accommodated as many as five vessels near the feet, while grave pits 9 and 12 are wider at their northern end for the same purpose. It is only in grave pit 5 that a jar is placed near the pelvis of the body.

In grave 13, bones of a goat (or sheep ?) were found, while in grave 6 teeth of *bos indicus* were encountered.

Joint Burial

One of the most important contributions made by Lothal to the burial rites of the Harappans is the practice of joint burials. Three such burials, all belonging to phase III,

[1] R. E. M. Wheeler 'Harappa : The Defences and Cemetery R 37' *Ancient India* No. 3 (Delhi, 1974) p. 87.

were noticed in the cemetery. This unique method involving simultaneous inhaumation of two bodies has not been known at any other Harappan site, except at Damb Buthi, where 'atleast two adults were represented in a single burial group'[1]. Another instance where two individuals were buried in a single grave is at Mari[2]. Watelin has mentioned joint-burials at Kish[3], which Childe considers as a *Sati*-burial.

The best preserved skeletons (8 and 9) in the joint burials of Lothal come from grave 7 which is lined internally with mud-bricks. The heads lie to the north slightly tilted towards the east. Skeleton no. 8 was lying on its spine while the one to its right i.e. no. 9 was lying on its left side. The lower limb bones below the femur of both the skeletons were found missing as the grave pit was disturbed by a later pit and subsequent erosion. Sarkar says that both the skeletons are of adult males with a familial resemblance between the two individuals as indicated by the measurements and craniogram. The skeleton no. 8 is said to be older than no. 9. A copper ear-ring was found near the ear of skeleton no. 9. According to Sarkar, skeleton no. 2 in another joint burial is said to be of an adult male, while skeleton no. 3 is said to be a young adult. In the latter case the sex is not known. In the third joint burial one skeleton is of a male and the other is also suspected to be an adult male. Here again skeleton no. 13 is said to be younger in age than skeleton no. 14. In this connection it may be mentioned that according to Chatterjee and Kumar[4] four skeletons from Lothal are said to be of females. Two of them are from joint burials.

B. HARAPPA AND OTHER SITES

Apart from inhumation burial in cemetery R 37 and cemetery H—Stratum II of Harappa, twentyone jar-burials were encountered in Stratum I. In Cemetery R 37 the bodies were fully extended and oriented as in Lothal. It is not certain whether the so-called fractional burials were collections of bones made after exposure of the body or merely disturbed extended burials. Pot-burials or Stratum I were however true fractional burials. Post-cremation jar-burials were suspected in Stratum V of AB Mound. Further evidence of this practice comes from Sutkajendor.

Fractional burials were also noticed by Stein at Derawar in Bahawalpur and at Mehi in Baluchistan.

It is generally believed that the Harappans always buried the dead, but cremation was a funerary practice followed at Sutkajendor, a Harappan settlement on the Makran coast. Mehi in South Baluchistan is another site wherefrom cremation has been reported. In this connection it is necessary to note that if burial as a funerary method was confined to

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[1] N. J. Majumdar 'Explorations in Sind', *Memoirs of the Archaeological Survey of India*, No. 48 (Delhi, 1934), p. 158.

[2] V. G. Childe, *New Light on the Most Ancient East* (London, 1952), p. 419.

[3] Watelin, *Excavations at Kish* IV (Paris, 1934) p. 19.

[4] B. K. Chatterjee and G. D. Kumar 'Racial Elements in post-Harappan skeletal remains of Lothal' *Anthropology on the March* (Madras, 1963) pp. 104—10.

persons in the age group 20—30 and below at Lothal, as made out by Prof. Sarkar, it may suggest that persons of higher age group were disposed of by exposure to elements or by cremation.

Literary references suggest that inhumation burial and cremation were both in vogue as early as the Vedic times[1]. The term *agnidagdha*[2] meaning 'burnt with fire' applies to the dead who were burned on the funeral pyre, whereas the term *anagnidagdha*[3] refers to the disposal of the dead other than by burning. This may include burial as well as exposure, for, the *Atharvaveda* refers to 'casting out' *(paroptāh)* and exposure to the elements *(Uddhitāḥ)* as two other methods of disposing of the dead. A hymn in the *Rigveda* describes the ritual attending burial. The male dead was buried with full attire holding the bow in one hand. At one time, it is said, 'his wife was immolated to accompany him'[4]. In later Vedic period the son took the bow from the hand of the dead man and the widow was led away from her dead husband by his brother or nearest kinsman. A stone was also set between the dead and the living to separate them. The reference to coffin *(Vriksha)* is contained in the *Atharvaveda*[5]. In this connection the occurrence of a wooden coffin at Harappa is highly significant. The reference in the *Rigveda* and *Atharvaveda* to the house of earth *(bhūmigriha)*[6] may suggest that burial was also practised side by side with cremation in the Rigvedic period. The use of mud bricks for the coffin at Kalibangan is suggestive of *bhūmigriha.*

For the disposal of the dead, the *Śatapatha Brāhmaṇa* prescribes a four-cornered mound facing the southeast on a ground inclined to the north and out of sight of the village in a peaceful spot amid beautiful surroundings or on barren ground[7]. For an *Agni-cit* (builder of the fire-altar) a funeral mound like a fire-altar is prescribed. It may be noted that in this connection that the mud-brick lining in grave no. 7 at Lothal follows the plan of an *'agni-cit'*- the fire-altar. According to the *Śatapatha Brāhmaṇa* the Easterners *(Prācyah)* made their mounds round. The burial referred to in the *Vājasaneyī Samhita* is said to allude to the post-cremation burial of the ashes in the burying ground *(smaśāna)*. At Kalibangan one could notice a skeleton burnt at specific points only, namely the mouth, shoulders, chest, knee-caps etc. Another evidence of cremation is the occurrence of charred human bones beside post-cremation burials in pots. Other ceremonies observed in disposing of the dead may be noted here. The *Rigveda* refers to wrapping of the body in flax. According to the *Atharvaveda*[8] a draft-ox was burnt presumably for the dead to ride in the next world. The Lothal people too offered goat and ox to the dead, as is evident from the horns of a goat found in grave 13 and the teeth of *bos indicus* in grave 6.

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[1] P. V. Kane. *History of Dharmaśāstra,* IV (Poona, 1953), pp. 231-33.

[2] A. A. Macdonell and A. B. Keith, *Vedic Index. I* (Varanasi, 1958) p. 8.

[3] *Rigveda,* V. 8; X; 18.

[4] Macdonell and Keith, *op. cit.,* I. p. 8.

[5] *Atharva Veda,* VIII, 2, 25, 3, 70.

[6] *Rig Veda,* VIII. 89, I; *Atharva Veda* V, 30, 14; XVIII, 2-52.

[7] *Śatapatha Brāhmaṇa* ii. 5, 2, 48 etc.

[8] *Atharva Veda* V. 31, 8; XI, 18.

C. SATI

Sankalia has raised an objection to the description of Lothal twin-burials as *Satī*. According to him, it is an anachronism as *Satī* connotes a very highly specialized conception and conveys the meaning of self-immolation by the wife on a funeral pyre[1]. In this connection it may be recalled that the practice of immolating the wife by burying her with the dead husband was in vogue in the Vedic society also (above p. 142), but it seems to have been given up slowly, and was observed in a token form in the Brāhmaṇa period. In fact the evidence from Lothal suggests that the Harappans immolated the wife with the dead husband in phase III by burying both together. They however gave up the practice in phases IV and V. When *Satī* was revived in the early medieval period, the Rajput ladies observed self-immolation by throwing themselves into the funeral pyre of the husband. In most societies what was once a high moral concept degenerates into a blind faith. If the wife was not willing to die, she was perhaps forced to die with the husband by administering some medicine. It is not known how the Harappans dealt with the situation.

5. GRAVE GOODS

The grave goods consist mostly of earthenwares. In a few cases, however, ornaments such as copper ring and shell bangles were also found in the grave pits. On the whole, it must be said that most of the Lothal burials are poorer than the average burial at Harappa, Rupar and Kalibangan in pottery and other equipment. This may be partly due to the fact that owing to ploughing and erosion the Lothal graves were disturbed and the pots broken into frangments. Whatever is still intact gives us an idea of the burial pottery. The vessels are sturdy but the slip has disappeared in most cases owing to water-logging and salt action. The dish-on-stand with a carination, the small jar with a low neck and bulbous body, and the convex-sided bowl are in the Harappa Red Ware (pl. CLXXXIIIA-B), while the round-bottomed jar with a flaring rim and the bowl with a stud. handle are in the Micaceous Red Ware. These types occur in the burials of Period A. The high-necked jar with a globular body and round bottom and the *loṭa*-shaped vessel, both in the degenerate red ware, occur in the burials of Period B. Unfortunately, all traces of painting on the vessels from Period A have disappeared owing to saline action. Some wavy lines, intersecting loops, dots, fronds and horizontal bands are faintly visible on a few vessels from Period B. Other grave goods consist of bangles and beads of chank shell and terracotta, as also a copper ear-ring.

It appears from the teeth of the *bos indicus* found in grave 6, the horns of a sheep in grave 13 and some animal bones in grave 11 that either the animals were sacrifided on the death of a person to please the gods or else, meat was offered as food to the dead. It is interesting to note in this connection that bones of ox were found in the burials at Damb Buthi and those of sheep and goat at Nal. The practice of offering meat on the occasion

[1]. H. D. Sankalia, *Prehistory and Protohistory in India and Pakistan* (Poona, 1974), p. 375.

of offering annual oblations to the *pitṛis* is still in vogue among the Kashmir Brahmins. Offering of a goat with the dead during cremation is referred to in a hymn addressed to *Agni* in the *Rigveda.* The goat was a sort of a path-finder to the dead.

6. SEX AND AGE

The age, sex and ethnic strain of the persons buried in joint burials as made known by Sarkar are given below:

Table III

Skeleton No.	Age	Sex	Ethnic strain
SK 2	Adult	Male	Dolichocephal
SK 3	Young adult	Not known	Not known
SK 8	Adult	Male	Dolichocephal
SK 9	Adult	Male	,,
SK 13	Adult	Male	Not known
SK 14	Adult	Male (?)	Brachycephal

Sarkar examined nine skulls out of which eight were of adults. In this connection it is necessary to mention that Chatterjee and Kumar who examined earlier the same eight skeletons and other bones have identified the sex of four adults out of eight as female, whereas Sarkar mentions only one female. The field no., measurements and other details mentioned by Sarkar in the case of two skeletons from single burials agree with those given by Chatterjee and Kumar. In both the reports the sex is said to be male. Of the remaining six skeletons four come from joint burials and two from single burials. If the two skeletons from single burials belong to females, atleast the remaining two females should have come from the joint burials. As one in each of the two skeletons in the two joint burials is known to be of a male, the remaining one in each of the two joint burials (SKs. 2 and 3 and SKs. 13 and 14) must be of a female. It is therefore suggested that a practice similar to the *Sati* involving self-immolation of the wife on husband's death was in vogue in phase III, but appears to have been given up later on. No joint burials were found in phases IV and V.

Skeletons of fifteen adult males, one adult, two young adults, a child and an infant have been identified by Sarkar. According to him the sex of another adult could not be ascertained. He has observed that there is an over-whelming majority of male adults who

had not grown the wisdom tooth. His remark that the cemetery may not represent the true population of Lothal is significant because of the fact that the skeletons belong to individuals in the age-group 20-30. The search made for locating another cemetery, if any, has not yielded any result so far. It therefore remains to be answered as to how the older folk were disposed of when dead. The query cannot be simply dismissed by saying that no one lived beyond 30. The greater possibility is that they were cremated.

7. CHOPPING MARKS

In the case of skeleton no. 6, Sarkar says that chopping marks were noticed on the tibia, while in the case of skeleton no. 11 fractures of the skull and legs could be seen. In the light of his earlier observation that there is an overwhelming majority of males and most of the skeletons are of persons in the age-group 20-30 he concludes that the death of these persons was due to violence. But it must be clearly understood that all the twenty skeletons examined by him do not belong to one phase and hence all these persons did not die simultaneously. The phase-wise distribution of the skeletons is given below:

Skeleton	Phase	Skeleton	Phase	Skeleton	Phase
SK 2 & 3 SK 4 SK 8 & 9 SK 13 & 14	III	SK 7 SK 10 SK 11 SK 15 SK 16 SK 17 SK 19	IV	SK 1 SK 5 SK 6 SK 12 SK 18	V

Furthermore, chopping marks or wounds caused on the leg need not necessarily imply death due to violence and much less a war when leg injuries are noticed on two out of 20 persons dead in different periods.

8. TREPHINATION

Sarkar has observed that the skull of a child (SK. 15) about 9-10 years of age found at Lothal bears marks of trephination. Dr. S. K. Basu, former professor of Anatomy, Nilratan Sircar Medical College and now Lecturer in Physical Anthropology in the Department of Anthropology, Calcutta University, who examined the skull says that '.........it (bevelling) might have been produced by some instrument before the skeleton bearing the specimen was buried. If we presume the latter statement, in the absence of signs of any bony

repair, one would conclude that the person did not survive long after the cut was effected or that the cut was made post-mortem'. This is a unique evidence of trepanation from Lothal, and can be regarded as the earliest instance of surgical operation of its kind. There is not only further archaeological evidence from Kalibangan but also enough literary evidence to show that trephination was practised in India as early as 500 B.C. by Jivaka, the famous physician-cum-surgeon. According to the *Mahāvagga*, he is said to have learnt surgery in the University of Taxila[1]. The *Suśruta Samhitā* also refers to trephination[2]. Pandit Vallala describes in his *Bhojaprabandha*[3] a surgical operation performed on king Bhoja of Dhar by two brother-surgeons who trephined his skull.

9. DATE OF THE BURIALS

A word must be said about the date of the burials. The Harappa Culture at Lothal has been variously described by different scholars, as 'sub-Indus', post-Indus, post-Harappan and late Harappan[4] either because of the occurrence of new ceramic wares such as the black-and-red ware and the Micaceous Red Ware or because of a new style of painting different from the Harappan noticed on the pottery from Lothal. These terms cause confusion and may be misleading. It may be emphasised here that the burials belonging to phases III and IV (2200—1900 B.C.) represent the mature Harappa Culture and those from phase V (1900—1600 B.C.) the degenerate phase thereof designated Late Harappa Culture.

10. ETHNIC AFFINITIES

Sarkar has classified nine crania found suitable for measurement into two groups. Skull nos. 2, 8, 9 and 11 belong to group I showing a dolichocranical form as contrasted with skull nos. 14, 17 and 18 of group II showing a brachycranial head form. There are differences in other measurements also. The former, he says, are comparable with the long-headed group and the latter with the broad-headed group of Sialk which, according to Vallois, are Aryan and Armenoid respectively. Skull no. 10 is said to reveal an Australoid ethnic strain. Chatterjee and Kumar who also studied the skeletal material from Lothal have reached the following conclusion.

They have identified three racial types:

(1) Large and rugged, long-headed, having high cranical vault, strong brow ridges, and comparatively long and narrow face akin to the proto-nordic or caucasoid type of Harappa, Tepe Hissar III and Palmyra.

(2) Medium-headed and smooth, having well-arched cranical contour associated with protruding occiput akin to the proto-Mediterranean or Mediterranean type of Harappa, Mohenjo-daro, Chanhu-daro and the Nippur skull of Baghdad.

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[1] *Mahāvagga*, VIII, 1. 18.

[2] *Suśruta Samhitā*, VI. 1.

[3] Vasudeva Sarma (ed), *Ballala's Bhojaprabandha* (Bombay, 1932) pp, 77-78.

[4] Chatterjee and Kumar, *op. cit.* p. 110

(3) Broad-headed, having more or less vertical and flat occiput akin to the Alpino-Armenoid type of Harappa and Attai Telengete (Raichur).

A close racial affinity between the Lothal skulls and those of Harappa and Mohenjo-daro (2500—1500 B.C.), Chanhu-daro (female), Adichchanallur (megalithic), Nal, Sialkot, Maski, Bayana, (Chalcolithic and Copper Age), Ur (2000—1000 B.C.), Pre-dynastic Naqada (3200 B.C.) and Crete (3000—1500 B.C.)[1] is indicated.

11. OBSERVATIONAL REPORT ON THE SKELETONS IN THEIR *IN SITU* POSITION[2]

A. Grave 1, Skeleton no, 1 (fig. 21: pl. CXVIA)

A very fragile skeleton was found at a depth of one foot below the surface in a grave pit in SRG 8, B 1. Its orientation is north-south. Most of the bony parts including the skull are missing. A part of the left clavicle is found in its natural position and the ribs in a broken condition. Only the impressions of the vertebral column and cervical vertebrae which had decomposed can be seen on the soil. Left humerus is found in its normal position but with many breakages of the shaft. The pelvic girdle, only a part of which is available, is also very much damaged. Sacrum found in its normal position is in the process of disintegration. The shaft of the right femur noticed in its natural position has cracked and broken. The patella is found on the condylar region of the femur, the head of which has decomposed. The tibia is in articulation with the femur.

The orientation indicates that the skull lay towards the north.

The grave pit cut into layer 1 A comprising hard clay and kankar of darkish colour is sealed by layer 1.

B. Grave 2, Skeleton nos. 2 and 3 (fig. 21; pl. CXVII)

Two skeletons were found placed simultaneously and close to each other in a grave pit measuring 8 ft. × 3 ft. 6 in, the present depth being 1 ft. 2 in. The pit is cut into layer 3A and sealed by layer 3 in SRG 8, B 1. The skeleton of the eastern side is numbered as 2 and the one on the west as 3, both lying side by side. They are oriented north-south and the heads lying on the north face towards south-west. Both the skeletons are very fragile and damaged and the left half of skeleton no. 2 is missing owing to the disturbance caused by the grave pit of skeleton no. 11. The extremities of the long bones have already decomposed and others are in the process of disintegrating.

[1] Chatterjee and Kumar, *op cit.* p. 110.

[2] This record of observations made on the field was maintained by Shri R. N. Gupta, Excavation Assistant, (Anthropology).

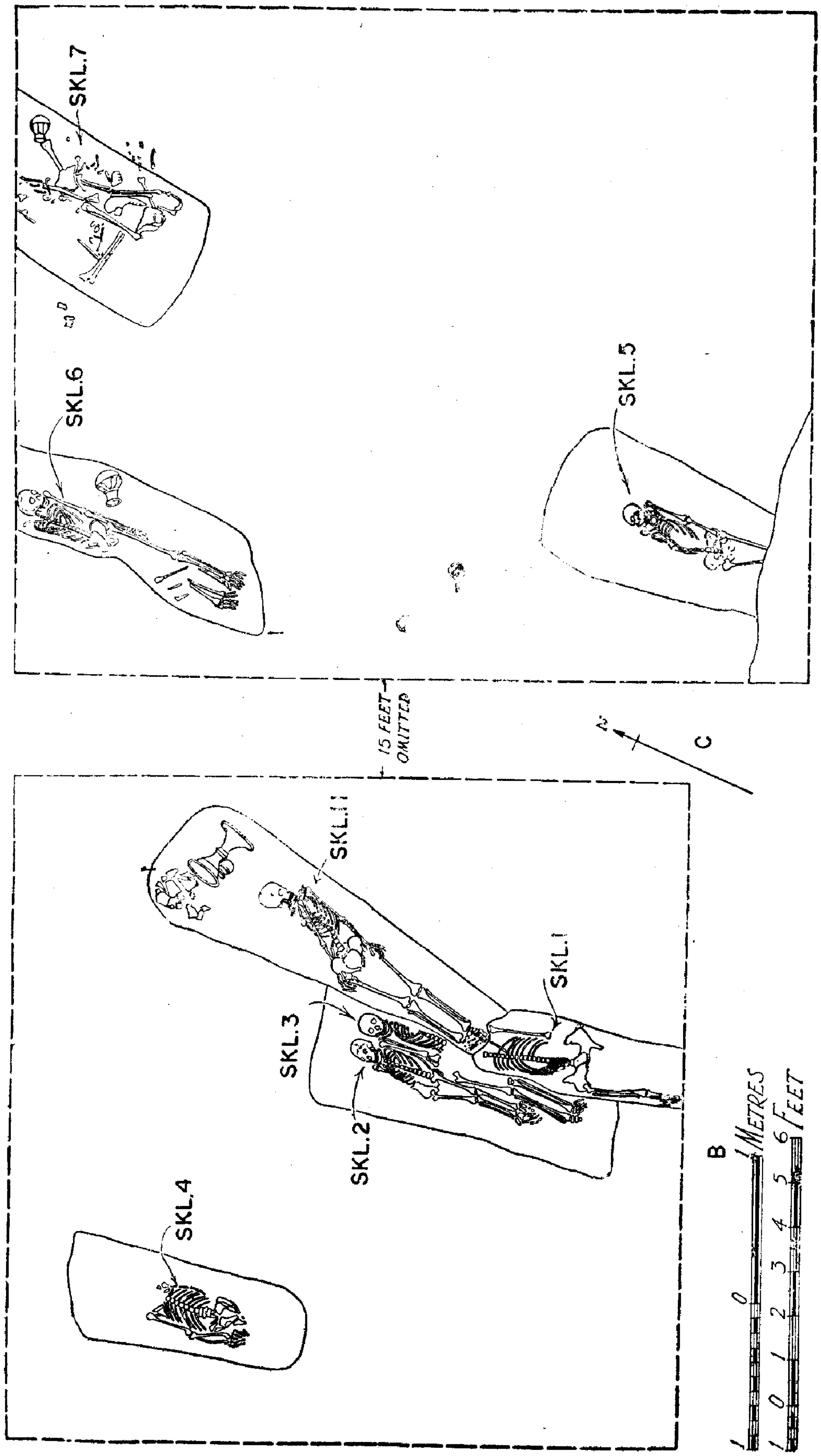


FIG. 21. skeletons 1 to 7 and 11

Skeleton no. 2	*Skeleton no. 3*
Skull	
1. The left parietal and the whole of the frontal together with the nasal bones and part of zygoma and mixilla are missing; the area below the nasal aperture is available.	1. Portions of the parietal and occipital are found in damaged condition. The rest of the bones are missing.
Mandible	
2. The mandible is found in an articulated state and very much broken. As the skull is lying on the right side, all the teeth of the upper and lower jaws of the left side are visible.	2. Portions of the body and ramus are found; the rest are missing; The skull is tilted and lying on its right side. The left side of the mandible and a few teeth of the same side are visible.
Clavicle	
3. Right clavicle is found in its normal position; the left one is missing.	3. Both the calviculae are found more or less in their normal position. But they are not intact.
Scapula	
4. A portion of the blade near the glenoid region of the right scapula is found. The left one is missing.	4. A fragment of the right scapula is found.
Humerus	
5. The right humerus is found in its normal position. The left one is missing.	5. The distal part of the left humerus is seen below the right humerus of skeleton no. 2. The right humerus is missing.
Vertebral column	
6. A few vertebrae are found but they are decomposed. Some impressions are left on the soil.	6. The vertebral column is decomposed leaving its impressions on the soil.
7. A part of the sternum is found.	7. Probably the sternum has undergone decomposition.

Ribs

8. The ribs of the right side are found in a fragile condition and are in the process of disintegration. The ribs of the left side are missing.

8. The ribs of both the sides are found but they are very fragile and in the process of disintegration. The ribs of the left side are found in a damaged condition.

Radius and Ulna

9. The radius and ulna of both the arms are missing.

9. The radius and ulna of the left arm are found with their proximal extremities lying below the right humerus of skeleton no. 2. The distal part of the above mentioned bones are lying in the ilium of the left hip-bone. The distal extremities of both the bones have undergone decomposition. The distal part of the right radius and ulna are found. The rest of the bony parts are missing.

Carpal, Metacarpal and Phalanges

10. All missing.

10. A few phalanges are found on the proximal parts of the femurs.

Pelvis

11. Missing.

11. Only portions of ilium are found.

Femur

12. Right femur is found. The left one is missing. Both the ends have undergone disintegration. The shaft is found in broken condition.

12. Both the femurs are found in their respective normal positions, but in broken condition with their extremities in the process of disintegration.

Patella

13. The right patella is found more or less in its normal position but the left patella is lying on the earth near the proximal end of the left tibia.

13. Both the patellae are found more or less in their normal position.

Tibia

14. Both the tibii are found in their natural position together with the respective fibulae. All the bones are found with many breakages.

14. Both the tibii are found in their normal position together with the respective fibulae. Both the ends of the bones have undergone decomposition and are in a broken condition.

Tarsals, Metatarsals and Phalanges

15. They are in a disintegrated condition.

15. Parts of the tarsals and meta-tarsals are in a damaged and disintegrated condition.

Other particulars

16. The available length of the skeleton is 5 ft. 5 in

16. The available length is 3 ft. 11 in

C. GRAVE 3, SKELETON NO. 4 (fig. 21; pl. CXVIB)

This skeleton was found in SRG 8, A 1 in a grave pit measuring 7 ft. × 2 ft. 6 in. the available depth being 10 in. only. It is cut into layer 3 A and sealed by layer 1.

The skeleton is highly damaged and most of the bony parts are missing. Only the thorasic region is available. A portion of the right scapula, right humerus, right radius and ulna, a few right carpal and metacarpal bones, a fragment of the left humerus and ribs are found. The thorasic vertebral column has undergone decomposition and other regions of the vertebral column are missing. From the position of the bones it seems that the orientation of the skeleton was north-south with the skull towards the north. The skeleton lies on its back.

D. GRAVE 4, SKELETON NO. 5 (fig. 21; pl. CXVIIIA)

This skeleton was found in a very much disturbed condition owing to erosion and cultivation. The grave-pit measures 6 ft. × 2 ft. 6 in., the depth being one ft. in SRG 8 D 1. It is cut into layer 1A and sealed by layer 1. The orientation of the skeleton is north-south with its longer axis lying 10° north-west and the head towards the north. Almost all the bones are decomposed and broken. The shapes of most of the individual bones are maintained by the bony fragments and silt. The skull is missing except at the occipital region which is found *in situ*.

Skull

The facial region of the cranium is missing, but the occipital region is found embedded in the soil. The occipital bones are broken into bits.

Mandible

It is found lying in the north-east to south-west direction immediately south-west of the occipital bony fragments in its natural position and articulated with the skull. Although decomposed, its shape can be made out from the fragments. Two left molars, two left pre-molars, two right molars and two pre-molars are found in their natural position, while the second right molar is found in articulation with the second right upper molar which indicates that before the distrubance the mandible was in its normal articulated position with the skull.

Vertebral Column

It is decomposed but the shape is maintained by earth right from the occipital bones upto the sacrum. The sacrum is also in the process of disintegration.

Clavicle

The claviculae are lying more or less in their normal position but slightly inclined in north-south direction, probably due to the pressure from sides. Both the claviculae are very very fragile and in the process of disintegration.

Scapula

The glenoid portion of the left scapula found in its normal position is disintegrating. Right scapula is missing.

Humerus

Left humerus is found in its natural position. Its head is decomposed and the shaft has cracked and is disturbed. The distal extremity has undergone decomposition. The right humerus is missing.

Ribs

Most of the ribs have undergone decomposition but only the shapes are maintained in the earth. The ribs found here are very fragile and broken.

Pelvis

Only the iliac portions of the pelvic girdle are found in a broken condition. The rest of the bones have undergone decomposition.

Femur

Both the femurs are found in the normal position articulated with the pelvis and the head of the tibia. Both the ends of the femur have undergone decomposition. The shafts are found broken and heavily cracked too.

Tibia

Both the tibia are found in a normal articulated position with the corresponding femurii. The distal parts are missing, probably due to the disturbance caused by a pit of late period. Both the shafts are found broken.

E. Grave 5, Skeleton no. 6 (fig. 21; pl. CXIX)

A skeleton was found in the north-west corner of the grid D 1 with the skull touching the northern section at a depth of 4·5 in. below the modern ground level. The grave-pit together with the skeleton is very much disturbed due to ploughing.

The skeleton lies in a grave-pit measuring 7 ft. x 2 ft. 4 in. and its depth is 1 ft. 2 in. It is sealed by layer 1 and cut into layer 1A comprising loose earth, brickbats and potsherds together with a few stone chips. A high-necked jar painted with late Harappan designs in black over red is found placed near the pelvis.

The orientation of the skeleton is north-south with its axis 20° north-west. It is lying on its back. The skull is towards the north but facing east. The skeleton is very much damaged probably due to ploughing and most of the bony parts have undergone decomposition and some are in the process of disintegration. Fragile ones had to be strengthened before cleaning. Portions of the right ulna, right humerus and shaft of a long bone (probably part of tibia) are found lying scattered near the feet of the skeleton. Right tibia and fibula are found in their normal position, but proximal extremities are running deep below the earth. A few phalanges are lying scattered slightly away from the joint. They are indicative of the disturbance of the area. The ribs and vertebral column have undergone decomposition, but the impressions together with the disintegrated powdery bones are found. The lumber vertebrae together with the sacrum are missing.

Skull

Due to the position of the skull norma lateralis of the right side is visible. The skull is cracked, fragile and distorted. The maxillary region is in the process of disintegration while the nasal bones have already decomposed. The malar bones are broken and the bone forming the zygomatic arch is missing. The alveolar region has undergone decomposition but the teeth namely, three right molars, two right pre-molars, one canine and two incisors are in their respective positions.

Mandible

The right half of the mandible is exposed and found intact with all the teeth of the right side. The mandible is very much cracked and the chin region is missing probably due to decomposition. The condilar region is missing but the coronoid process is found. The jaw as a whole is broad and thick without any erosion of the alveolar region.

Vertebral column

The vertebral column is decomposed; only the impressions and the powdery bones are found. The lumber and sacral vertebrae are missing.

Clavicle

The left and right claviclae are found in the normal position. The shafts are cracked and broken. The proximal extremities have undergone decomposition. The distal end of the clavicle is missing (probably decomposed).

Scapula

Both the scapulas are found in their respective normal position. The glenoid regions together with the portions of the blades are found below the ribs and the rest of the portion is missing.

Ribs

Most of the ribs are decomposed leaving only the impressions and the disintegrated powdery bones of the ribs. The skeleton is disturbed due to ploughing and other human activities and the ribs are damaged.

Humerus

Left humerus is found in its normal position and its head has decomposed and the trochlear end is in the process of disintegration. The trochlear notch is directed towards east. The shaft is broken and has many cracks.

Radius and Ulna

The left radius and ulna are found in their normal position articulated with the left humerus. Both the extremities of the radius and ulna are decomposed. The radius is found lying on the ulna. The position of the radius and ulna together with the phalanges indicates that the body was placed with its palmer surface towards the thigh. The right ulna is found near the proximal part of the left tibia forming 'Y' shape with the latter.

Metacarpals and Carpals

A few carpal bones are found on the grater trochanter of the left femur. The first metacarpal and a phalange are found on the inner side of the thigh bone indicating that the palm was placed on the thigh. Both the ends of the metacarpal have decomposed. A few digits are however found.

Right carpals, metacarpals and digits are missing. Two metacarpals are found west of the distal part of the left femur.

Pelvis

Left os-innominatum is found immediately west of the left radius and ulna in a tilted state with the inner surface of the ilium directed upward. The ilium is in the process of disintegration. The region of the left acetabular cavity has undergone complete decomposition.

Femur

Left femur is found in its normal position. The head is in articulation with left acetabular cavity, but has undergone decomposition leaving only the impression on the soil. The shaft has many breaks. The distal extremities of the femur are decomposed leaving only the impression. Right femur and patulla are missing. One incisor tooth is found near the neck of the left femur indicating the disturbance of the grave-pit.

Tibia and Fibula

The left tibia and fibula are found in their normal position but in broken condition. The proximal and distal ends are decomposed. The right tibia and fibula are found on the left tibia with their proximal ends going deep under the soil. Between these two tibia two broken shafts of long bones are found. One is humerus (probably the right one dislodged from its normal position due to the disturbance) but the other one could not be studied in its *in situ* state.

Metatarsals and Tarsals

These bones are decomposed leaving impressions only. The talus bones of both the feet could be visualised. The metatarsals are found in their normal position but both the ends have undergone decomposition.

F. GRAVE 6, SKELETON NO. 7 (fig. 21; pl. CXVIIIB)

At a depth of 1 ft. 3 in. a few scattered human bones were found lying unarranged nor were they properly orientated. The pit appears to have been cut into layer 3. A

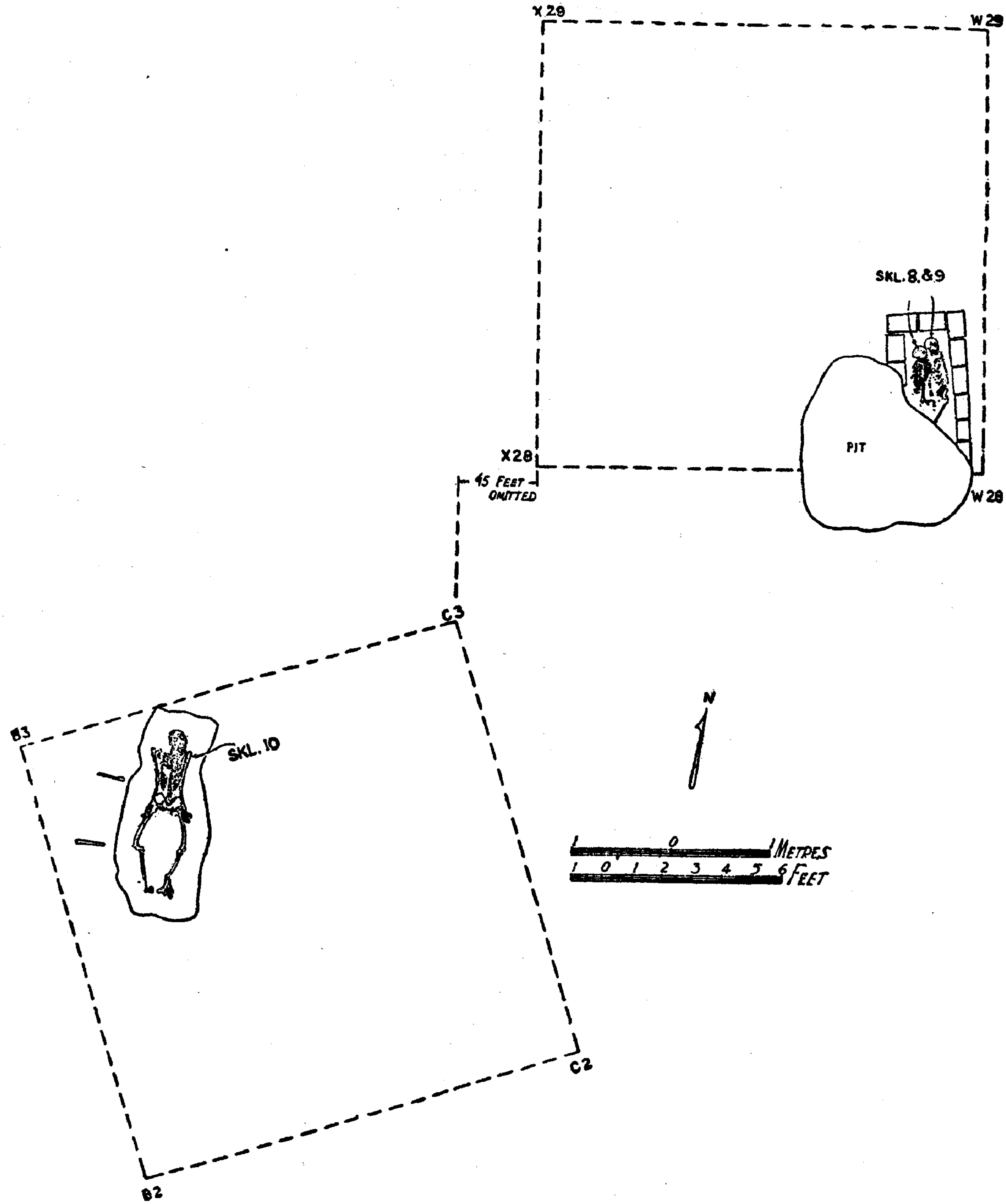

X 29
W 29
SKL. 8 & 9
PIT
X 28
W 28
45 FEET OMITTED
C3
B3
SKL. 10
N
METRES
FEET
C2
B2

FIG. 22

high-necked jar of red ware with flared rim formed part of the grave goods. A r oug outline of the grave-pit measuring 6 ft. 6 in. x 4 ft. 10 in. could be made out. Several bones are missing. While some are incrusted with calcareous material other bones a re n the process of disintegration.

Available bones

Both the femurii were found. The head is missing, probably owing to ploughing and other operations. The distal extremity of the right femur has undergone decomposition. A portion of the left clavicle which is in the process of disintegration is found north of the left femur. Near clavicle are a few pieces of disintegrated ribs and above the left femur is a scapula which is completely decomposed. A few disintegrated ribs are encountered south of the scapula. The left humerus is found near the distal part of the left humerus, at the distal end of which lie the pelvic bones. To their west is one of the tibias, the other lying in the east-west direction forming an 'L' shape with the former. A few disintegrated bones are found near the tibia. A long bone lies west of these disintegrated bones forming a 'T' shape with the tibia, while on the west of the pelvic bones, a radius and an ulna, the ends of which are decomposed, are noticed. The sacrum occurs near the proximal end of the ulna while the left humerus occurs below the radius and ulna. The distal end of this humerus could not be seen in its *in situ* position. Between the ilium and the radius is seen a shaft of a long bone.

Apart from the above mentioned bones a few pieces of ribs and damaged patella are found together with two teeth of *bos indicus*.

G. Grave 7, Skeleton nos. 8 & 9 (fig. 22; pl. CXXA)

Two skeletons are found in grave pit 7 measuring 8 ft. x 2 ft. 9 in. x 1 ft. 3 in. It is cut into layer 3 which is composed of sticky hard clay of whitish colour. The southern portion of the grave pit seems to have been disturbed by a later pit. The original pit was rectangular on plan but its available length and breadth are 5 ft. and 2 ft. 9 in. respectively. The grave pit is lined internally with one course of mud bricks to form a sort of structural coffin. The size of the brick is 15 x 9 x 3 in, as in the habitation mound. The pit has been filled with calcareous clay but its western, southern and eastern margins have been damaged by a later pit. The right side of the lower limb of Sk. 9 is altogether missing. Near the neck region a small copper ring has been found. The orientation of the skeletons is north-south and the skulls lie north tilted towards east.

Apart from damage some of the bones are decomposed, while others are in the process of disintegration. In some places impressions of bones are left. It seems that originally both the bodies were kept side by side simultaneously but due to disturbance the thoracic region of skeleton no. 9 has been lodged on the left side of skeleton no. 8, while the upper limbs of both the skeletons are jumbled up. The available bones are so fragile that even a slight breeze is sufficient to blow them away.

Skeleton no. 8	*Skeleton no.* 9
This skeleton is found near the eastern section of the trench.	This skeleton is found adjoining skeleton no. 8 to its west.
Skulls	
1. All the bones are found but they are very fragile and cracked.	Same as no. 8
2. The nasal bone at the distal extremity has undergone decomposition.	Same as no. 8
3. The maxillary region is present but full of cracks and breakage.	Same as no. 8
4. The mandible is found in its normal articulated state.	Same as no. 8
5. The chin region is in the process of disintegration.	Same as no. 8
6. All the teeth of both the upper and lower jaws are present.	Same as no. 8
Vertebral column	
7. Vertebral column has been slightly dislodged from its normal position, probably due to pressure of earth. All the vertebrae have undergone decomposition leaving only impression on the soil.	The vertebral column is very much disturbed by a later pit. Vertebrae are missing and most of them decomposed leaving only the impression on the soil.
Scapula	
8. The glenoid portion of the left scapula is found. The right one is probably lying under the bones of skeleton no. 9.	Only a portion is found in disintegrated state. The rest is missing.
Ribs	
9. The ribs are very fragile and in a disintegrated condition. Most of them are broken.	A few dislodged ribs are found.
Clavicle	
10. Both the claviculae are found but slightly dislodged from their normal position.	Clavicle not found.

11. A portion of the sternum is found.

Sternum not found.

Humerus.

12. The left humerus found in its normal position. The head is articulated with the glenoid cavity of scapula. The distal end is articulated with the left radius and ulna. It seems that the palm of the left hand was placed on the lower abdominal region of the body. The humerus is found in broken condition with many cracks.
The right humerus could not be seen; it is probably lying under the humerus of skeleton no. 9.

Only a portion of the left humerus is seen below fragments of scapula. The distal end is found more or less articulated with the corresponding radius and ulna. The right humerus is found on the ribs of the right side of skeleton no. 8 in a damaged condition. The distal end is in the process of disintegration.

Radius and Ulna

13. The left radius and ulna are in articulation with the left humerus. The distal parts are lying on the left iliac bone of the pelvis. Only the distal parts of the right radius and ulna are visible on the lumber vertebrae. The remaining protion is covered by the right humerus of skeleton no. 9.

The right radius and ulna are in articulated state with right humerus in damaged condition. The left radius and ulna, also damaged, are found lying immediately west of the left radius and ulna.

Metacarpal and Phlalanges

14. These bones are lying scattered on the pelvis of skeleton no. 8 and also beyond the pelvic region towards the south. The metacarpal and phalanges of the left hand of skeleton no. 8 are found on the iliac bone of the same individual.

Pelvis

15. The pelvic bones have undergone decomposition leaving only an impression on the soil. The left ilium is in a very fragile state.

A few fragments of the pelvic bones are found in the process of disintegration.

Femur

16. Only the left femur without its distal part is found in articulation with the lower border of the ilium. The other femur is missing.	Both the femurii are missing.

H. Grave 8, Skeleton no. 10 (fig. 22; pl. CXXB)

An extended burial is found on the western side of SRG 8, B 2. The skeleton is lying on its back. The orientation is north-south. The skull is lying towards the north facing eastwards. The axis of the skeleton is 10° north-west.

A skeleton was found in a grave pit measuring 7 ft. 5 in. x 2 ft. 9 in, and 1 ft. 5 in. deep cut into layer 2 in SRG 8, B 2. It lies in a north-south direction fully extended with its head to the north.

The skeleton is found in a damaged condition with all the bones including those of the broken cranium. The distal part of the right tibia, the tarsals and metatarsals are missing.

Skull

The skull is found in a distorted condition and broken into bits.

Mandible

The mandible is in a distorted state in articulation with the skull and has many cracks. As the skull is lying on its left side the teeth of the mandible and the maxilla of the right side are visible and found intact.

Clavicle

Both the claviculae are found in their normal position, but the extremities have undergone decomposition.

Ribs

They are in the process of disintegration leaving only their impressions on the soil.

Vertebral column

The vertebral column is found in its normal position but disintegration has begun. Most of the thorasic vertebrae have decomposed.

Humerus

Both the humeri are found lying by the side of the body in their normal position, but broken. The distal part of the right humerus and the head of the left humerus have undergone decomposition.

Radius and Ulna

The radius and ulna of both the arms are found lying below the ilium in their normal articulated state with the respective humerii. They have cracked.

Carpals, metacarpals and phalanges

The carpals and some phalanges of both the hands are found in their normal position but some are missing. The metacarpals of both the hands are found in their normal position with the hands in pronation.

Pelvis

The pelvis is found more or less intact. It is, however, fragile and the pubic region has decomposed leaving only impression on the soil. The ilium has cracked at many places.

Sacrum

The sacrum found in articulated state with the pelvis is fragile.

Lower limb bones

The lower limb bones are found in an abnormal position. The distal parts of both the femurii are wide apart from each other and twisted. The ventral surface of the shaft of the left femur is directed towards east and that of the right shaft towards west. The heads and distal parts of both femurii are in the process of disintegration and are found in articulation with the pelvis.

Patella

The left patella is found in its normal position but the right one is found lying on the distal part of the right femur i.e., slightly dislodged from its normal position.

Tibia

Both the heads of tibiae are found articulated with the respective femurii and have undergone decomposition leaving only their impression. Both the fibulae are in their normal positions and the shafts are broken. The distal part of the right tibia is missing.

A portion of the right calcaneum and the talus and calcaneum of the left foot are found in a disintegrated condition. A few metatarsals and phalanges are jumbled up near the tarsal bones.

I. Grave 9, Skeleton no. 11 (fig. 21; pl. CXVII)

A grave pit cut into layers 2 and 3 of SRG 8, B 1 contained a skeleton fully laid extended. Grave pit 1 has evidently proved to be of later period than the grave-pit 9 as the latter was already in existence when the former was dug. Grave pit 9 runs below the cervical and thorasic regions of skeleton no. 1. The time lag between these two graves may be long although the difference in depth between the two is not great. This is due to tremendous erosion which we know of from the floods at the end of phase IV. The available dimension of the grave pit is 8 ft. 6 in. × 2 ft. 8 in. The skeleton lies on its back fully extended but slightly twisted with the result that the right clavicle, thorasic vertebrae and mandible are dislodged. The sternum is lying vertical.

A dish-on-stand and two jars are found placed at a distance of one ft. north of the head. One of the jars with a low neck is painted in black horizontal bands over red. Similar decoration is also found on the shoulder. Another red jar is found in broken condition, and its rim is missing.

Skull

The malar bone and the maxillary region are fragile and the skull is distorted due to pressure of earth. The left eye, the lateral wall of the right eye and the nasal aperture are found distorted. The mastoid process is very highly developed.

Mandible

It is found dislodged from its normal position and there are many cracks and breakages. All the teeth of both the jaws are present.

Clavicle

The left clavicle is found in a fragile condition but in its normal position. The right clavicle is dislodged and lying on the proximal parts of the left clavicle.

Scapula

The portion near the glenoid cavity of the left scapula is visible. The right scapula is found lying vertically instead of horizontally, probably due to the twisting of the body. The blade of the right scapula has decomposed.

Ribs

Whereas the ribs of the left side are in their normal position, the ribs of the right side are tilted.

Sternum

It is dislogded from its normal position.

Vertebral Column

The vertebral column and thorasic vertebrae have been dislodged.

Pelvis

It is found intact but the pelvis girdle is fragile.

Sacrum

It is found in articulated state with the pelvis.

Humerus

The left humerus is in its normal position but the right one is lying over the ribs of the right side.

Radius and Ulna

The right radius and ulna are in their normal position and the extremities are however in the process of disintegration. The left radius and ulna are also in their natural position in articulation with the left humerus. Both the arms are lying below the ilium of the pelvis.

Carpal, Metacarpal and Phalanges

The right carpal bones have decomposed. The left carpal bones and the metacarpals of both the hands are in normal position. It seems that both the palms were kept on the thigh at the time of interment. A few phalanges are also found.

Femur

Both the femurs are in their natural position, their heads being in articulation.

Tibia

Both the tibiae are in an articulated state with the respective femurs. The febulae are also in their normal position.

Tarsals, Metatarsals and phalanges

The tarsal bones of both the feet are in the process of disintegration. The metatarsal bones are very fragile as also a few phalanges. All the bones of the feet are in articulated state. It seems that the feet were placed vertically at the time of interment.

J. GRAVE 10, SKELETON NO. 12 (pl. CXXIA)

A damaged skeleton is found at a depth of 8 in. below surface in SRG 8, B 2. The orientation of this skeleton is east-west and the skull lies towards the west. One dish-on-stand, one big earthen pot and a small jar of '*lota*' shape found near the leg bones form the grave goods. To the south of the right leg bones a few pieces of a second mandible are found while the mandible of the skeleton itself is found near the skull. One skeleton cannot have two mandibles. Hence the mandible and pottery show disturbance of another grave. The outline of the grave pit is not fully traceable. An approximate line is however visible on account of the difference in the colour of earth from the pit. The skull is found lying about 4 in. above the clavicle. The pelvic region lies below some of the other bony parts. The skeleton appears to have sunk owing to heaviness of the tumulus.

Most of the bony parts have undergone decomposition and a few are dislodged from their normal articulated position.

Skull

The damaged skull is found in the western section of the trench. A portion of the parietal bone is found in a broken condition.

Mandible

Slightly below the skull at its southern side the mandible is found with its chin directed downwards.

Vertebral Column

It is completely decomposed leaving only the impression on the soil. The thorasic vertebrae are dislodged from the lumber vertebrae.

Sacrum

The sacrum is found in its normal position but disintegrated.

Clavicle

The left clavicle is found near the mandible but the right one is found lying on the middle part of the thorasic region of the vertebral column.

Scapula

A portion of the left scapula is found in its normal position. The right scapula has disintegrated and is found lying near the proximal part of the right radius and ulna.

Ribs

A few ribs are found in a disintegrated state.

Humerus

Left humerus is found in its normal position, articulated with the left radius and ulna. The ends of the bones are decomposed. The proximal part of the right humerus is missing. The right humerus is found on the right radius and ulna with the shaft upward.

Pelvis

The pelvis is found in a disintegrated condition and the pubic bones have decomposed.

Femur

Both the femurii are found in an articulated state with the pelvis. Left patella is found near the condylar region of the left femur.

Tibia and Fibula

The right tibia and fibula are found in articulation with the right femur while the left tibia and fibula are lying between the dish-on-stand and the big earthen pot.

As already mentioned the skeleton under reference is not associated with the earthen pots found near its feet. The pots belong to a separate grave pit which is numbered as grave pit 'D' (below p. 169) and the pots are numbered as follows:

No. 1	..	Dish-on-Stand
No. 2	..	Small earthen jar of *lota* shape.
No. 3	..	Big earthen pot.

The fragment of the mandible is associated with the pots of grave-pit 'D'.

K. Grave 11, Skeleton nos. 13 & 14 (fig. 23; pl. CXXIB)

Two skulls have been found in a very disturbed grave at a depth of 1 ft. below surface. Owing to disturbance the lower limb bones are found in a much higher level than the rest. The orientation of the first skeleton is north-south and that of the second also appears to be the same. The broken skull and a few scattered bones are found closeby in the same pit, the outline of which is partially visible. The grave pit appears to have been cut into layer 3.

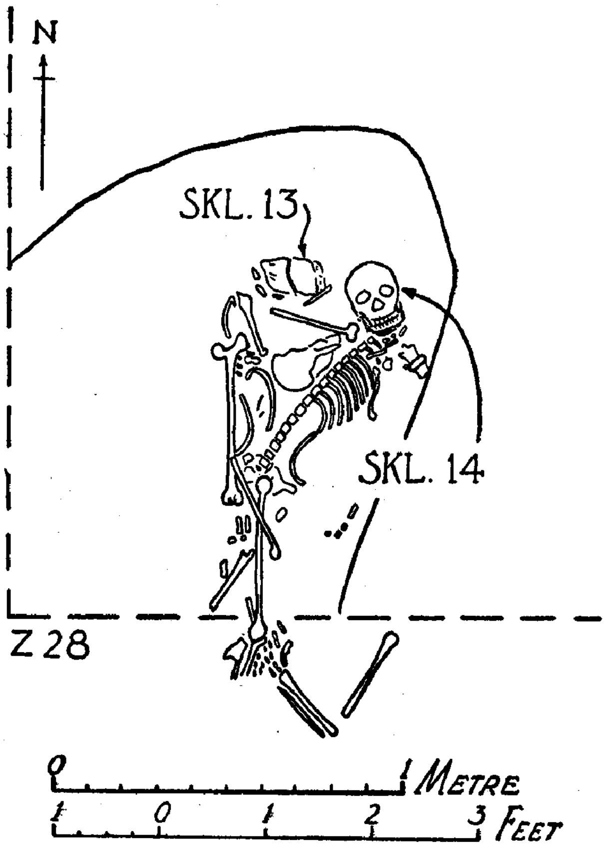


Fig. 23

The skull numbered 13 is completely damaged. A few fragments of the occipital and parietal bones together with the two left molars and two left pre-molars are found in an articulated state with maxilla. The disturbance was so violent that the whole skull seems to have been turned upside down. The palate, visible through the lower borders of the mandible, is directed towards the east and the chin downwards. From the position of the maxilla and the mandible it is clear that the jaw is in an articulated state. To the east of the mandible, the skull of skeleton no. 14 is found. Its face is directed upwards with a wide open mouth but the condyler region is found articulated with the skull. Both the skulls are heavily damaged. To the west of the mandible a part each of the humerus and scapula is found. The right os-innominatum is noticed near the skulls while a few stray pieces of ribs occur near the pelvic bones. The vertebral column is found in articulation with skull no. 14 and its sacrum. Both the claviculae are lying on the left side of the skeleton. The sacrum is found in a very damaged condition. The left os-innominatum is in articulation with the sacrum and left femur of the skeleton. A broken humerus is found on the left femur. Further west is the right femur. A fragment of the right scapula is lying near its head. Towards the south of the right femur and west of the left femur a piece of long bone (probably femur) is found in an inclined position. Between these two long bones a piece of radius is also noticed. A portion of the left tibia is in its normal position. Near the knee region a broken radius ulna, a few metacarpals and a humerus are found. It is significant to note that apart from these human bones a few animal bones are also found. The species cannot be easily identified.

Most of the bones of this grave are found dislodged from their normal position and lie scattered and damaged. From the skeleton no. 14 it seems that the orientation of SK. 13 was also north-south.

On the whole it can be said that this grave together with the skeletal remains was greatly disturbed.

L. Grave 12, Skeleton No. 15 (pl. CXXIIA)

A skeleton was encountered in a grave pit which is partly traceable at a depth of 1 ft. in layer 3 of SRG 8, E 2. Owing to decomposition it is difficult to lift the skeleton. Natural and human agencies have disturbed the surface soil and almost exposed the skeleton with the result that it has disintegrated much faster than other skeletons. All the bony parts have disintegrated leaving only the impressions with mud sticking to the broken fragments. The skeleton is oriented north-south with its head to the north. The skull, vertebrae, ribs, humerus, femurs and tibiae are traceable but cannot be lifted. Most of the parts are in articulation. A *lota*-shaped vessel found placed near the skull on the left side is characteristic of phase V.

M. Grave 13, Skeleton No, 16 (pl. CXXIIA)

Another disturbed grave is noticed in SRG 8, E 2 at a depth of 9 in.in layer 2A. Besides some skeletal parts a trough with a flared rim and wide mouth and a large jar are also found in a tilted position in the cutting. Accumulation of silt suggests that the skeleton and grave goods were completely disturbed by a flood resulting in turning the earthenwares upside down. Traces of the grave pit are almost wiped out. The skull is missing. Only a few long bones are lying helter-skelter. Two jars broken into fragments are also encountered closeby. It is interesting to note that the horns of a goat were found with the human bones.

N. Grave 14, Skeleton no. 17 (fig. 24; pl. CXXIII)

A grave pit measuring 10 ft. × 4 ft. 3 in. × 1 ft. and cut into layer 3 in SRG 8, C 2 is found to contain a skeleton and five earthen wares. The grave was partially disturbed by a later pit dug towards its north-west corner where flood-borne debris is also seen. The skeleton is lying north-south with head to the north. A dish-on-stand, a small jar with flaring rim and a large jar with bulbous body and round bottom are found near the right leg. A convex-sided bowl and a small-necked jar are placed near the left foot. This is an instance to show that sometimes vessels were placed near the legs also. The ceramic ware belongs to phase IV and stratigraphy confirms it. The skull, vertebrae, humerus, femur and both the tibiae are visible but in a highly disintegrated condition.

O. Grave 15, Skeleton no. 18 (fig. 24; pl. CXXIV)

A skeleton placed in east-west direction with its head towards the west in a grave-pit measuring 7 ft. x 2 ft. 6 in x 9 in. was noticed at a depth of 1 ft. in layer 2A in SRG 26.

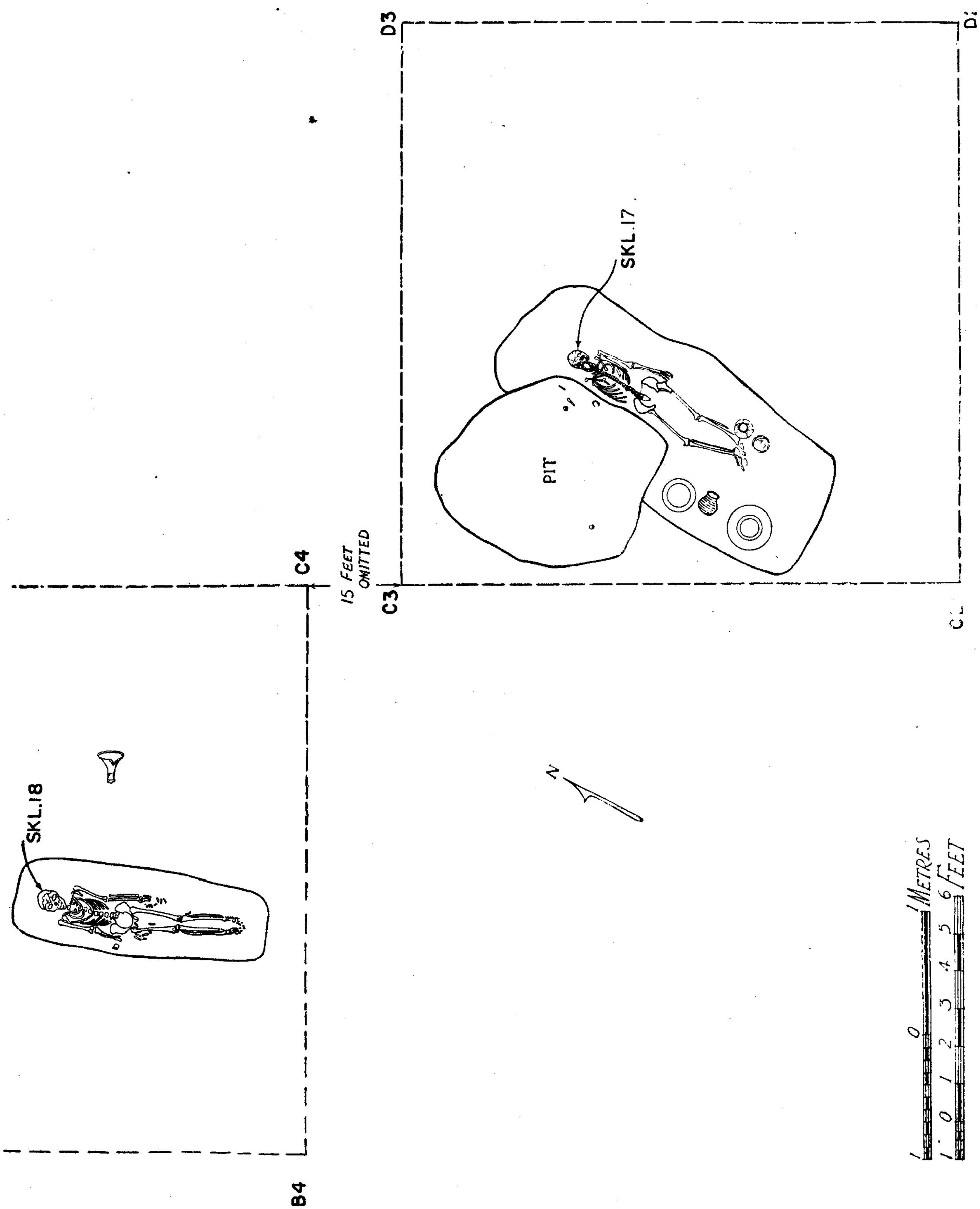


FIG. 24

It is a fully extended burial with all the bones properly articulated. No grave goods were found. However, further north of the grave a base of a dish-on-stand was encountered along with a few fragments of bones.

P. Grave 16, Skeleton no. 19

A few carpal and metacarpal bones were found in grave pit disturbed in the southern half at a depth of 1 ft. 2 in. The pit is cut into layer 3 and sealed by layer 2.

Pits

Five shallow pits varying in dimensions from 3 ft. × 1 ft. 6 in. to 4 ft. × 1 ft. 6 in. on plan were found to contain pottery and a few human bones. They have been numbered A to E. They do not appear to have been used for regular inhumation, primary or secondary. Only one pit contained fragments of a cranium.

CHAPTER IX

DECIPHERMENT OF THE INDUS SCRIPT

A. INTRODUCTORY

The Harappans developed a system of writing which consists of pictures, (fig. 25), ligatures (fiig. 27) i.e. combination of linear signs and simple linear signs (fig. 28). Corresponding to the two phases of Harappa Civilization namely the mature (early) Harappa Culture (2500-1900 BC) and the degenerate (Late) Harappa Culture (1900-1600 BC), two broad subdivisions of the Indus writing can be made out[1]. The former is called the Harappan Script (fiig. 25, *1-99*) and the latter the Late Harappan Script (fig. 25, *100-144*). Where both are meant the term Indus script is used. Some significant features of the Indus script noticed in the course of its analysis are listed below.

1. The earliest Harappan writing consisted of 52 signs (60 if stray pictures are also included) including 12 pictures and 40 linear signs, but the pictures were not used as pictographs or ideograms. They were phonetized and used as syllables. The addition of auxiliary signs in the case of 'man', 'fish', 'pipal leaf' and 'scorpion' signs (figs. 31B and 32B) and the combination of linear signs and pictures (fig. 31B, III *8-12*) are clear evidences of phonetization of most of the frequently occurring pictures.

2. Another salient feature of the Indus writing is the combination of basic (fig. 28) signs to form compound signs (figs. 31B to 32B) primarily as a space-saving device since the space on the seals was too small to write elaborately. With the help of such ligatures the Harappan scribes could form conjuncts and syllables. This unique system of writing resulted in producing signs which look like pictures. Detached strokes, brackets and enclosures used in Indus writing serve as word-separators, while short strokes attached to signs indicated phonetic variation.

3. By counting the compound signs also as basic ones the number of elemental forms is exaggerated unnecessarily. The Soviet and Finnish scholars who have not analysed the ligatures have counted 250 signs or more and thereby considered the Indus script as pictographic or logographic and given a picture value or a word value to almost all the signs[2]. But in reality there are only 52 basic signs in the Harappan Script (fig. 29 for linear signs; fig. 30, *25*, *27* to *37* for pictures) and 20 (22 if the variants of 2 signs are also counted) in the Late Harappan Script (fig. 29).

4. The basic signs can be identified without much difficulty since they occur independently in several inscriptions (fig. 28). After determining the basic signs the compound signs have been analysed into their elemental forms but care has been taken not to break up arbitrarily a picture into its inherent parts. The elemental forms

[1] Rao. S. R. *Lothal and the Indus civilization* (Bombay 1973)

[2] (a) Asko Parpola and others, in *Journal of Tamil Studies II* (Madras 1970)
(b) Knorozov, yu v, *Ibid*

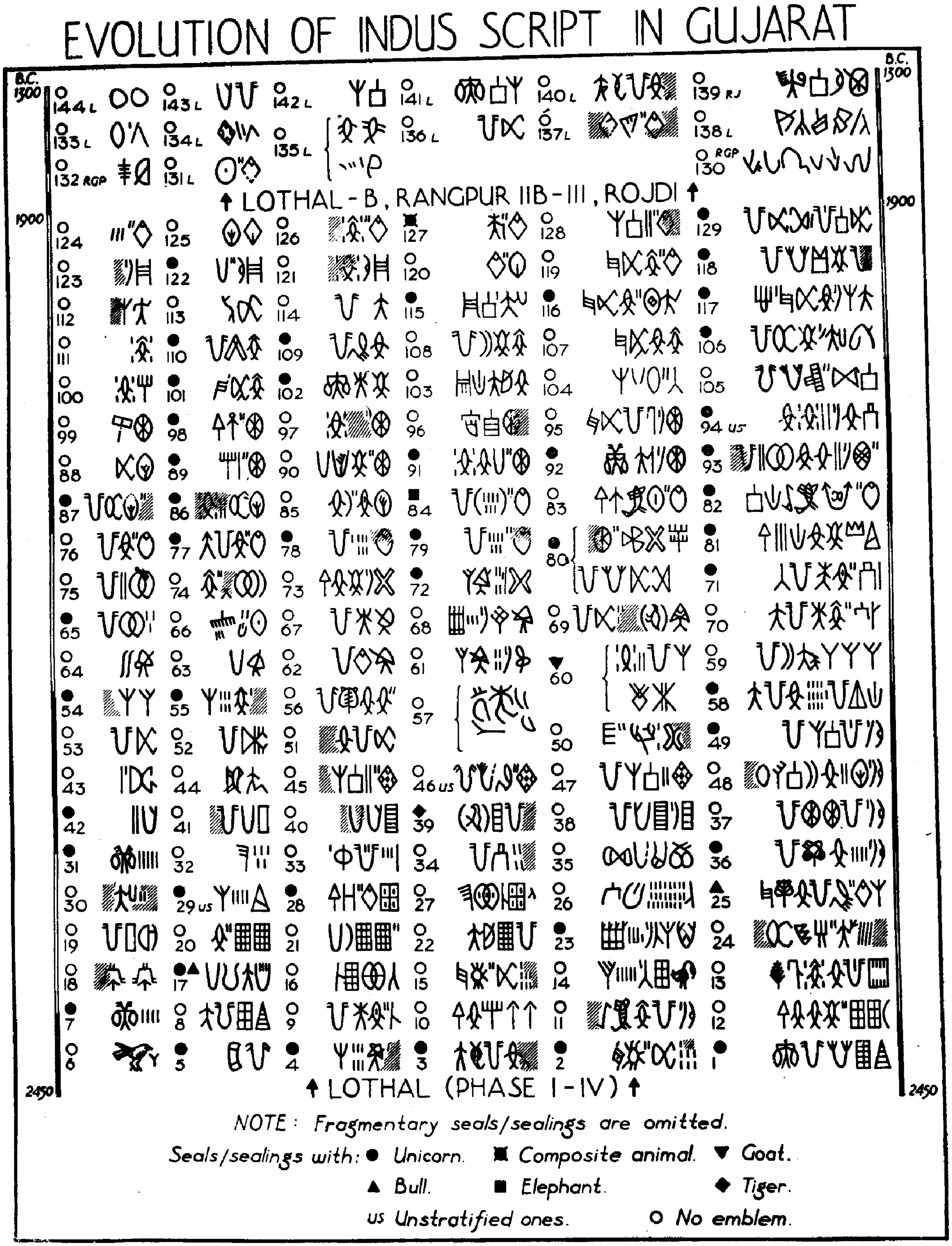

EVOLUTION OF INDUS SCRIPT IN GUJARAT
B.C. 1300
1900
2450
LOTHAL - B, RANGPUR IIB - III, ROJDI
LOTHAL (PHASE I - IV)
NOTE: Fragmentary seals/sealings are omitted.
Seals/sealings with: ● Unicorn. Composite animal. ▼ Goat.
▲ Bull. ■ Elephant. ◆ Tiger.
us Unstratified ones. o No emblem.

FIG. 25

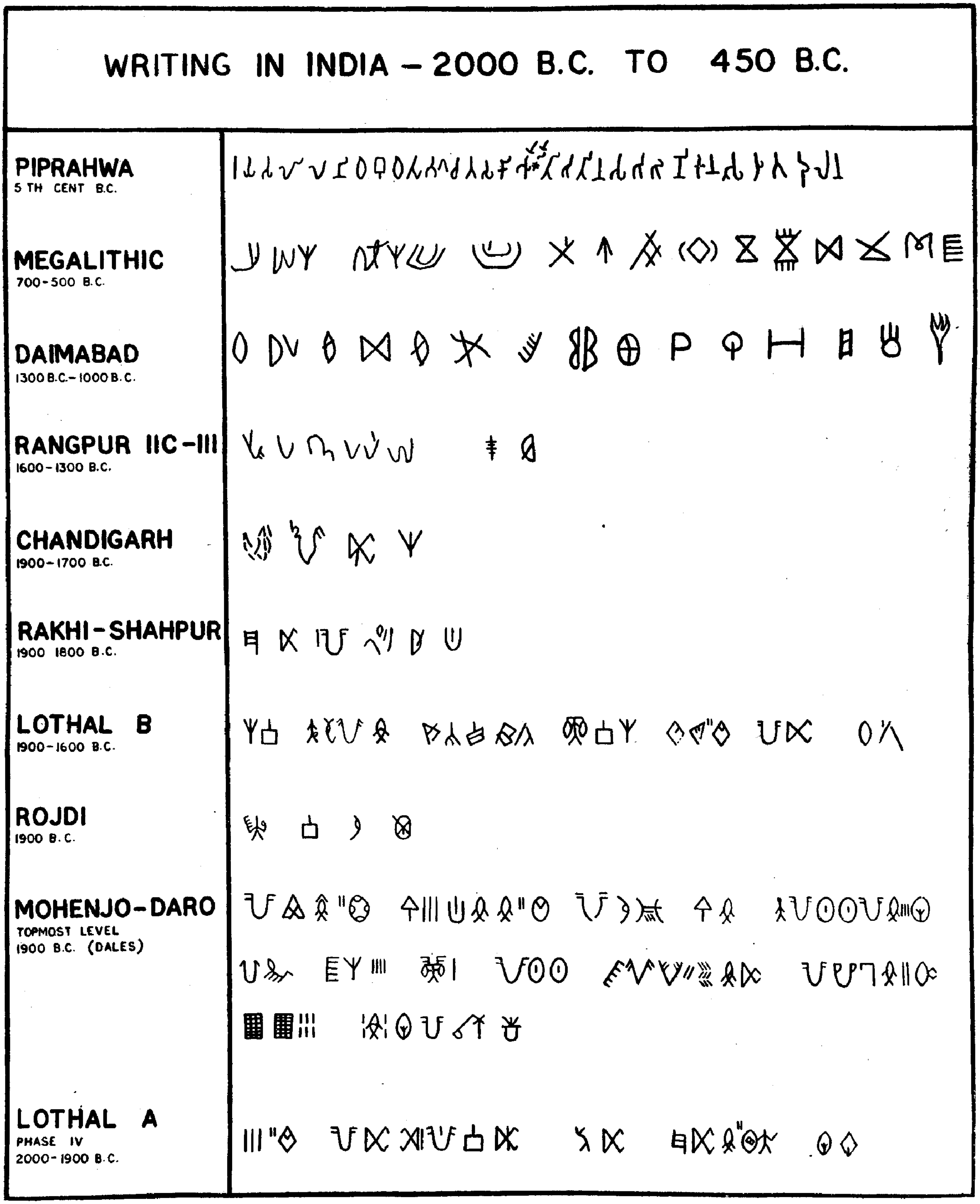

WRITING IN INDIA – 2000 B.C. TO 450 B.C.
PIPRAHWA
5 TH CENT B.C.
MEGALITHIC
700–500 B.C.
DAIMABAD
1300 B.C.–1000 B.C.
RANGPUR IIC–III
1600–1300 B.C.
CHANDIGARH
1900–1700 B.C.
RAKHI-SHAHPUR
1900 1800 B.C.
LOTHAL B
1900–1600 B.C.
ROJDI
1900 B.C.
MOHENJO-DARO
TOPMOST LEVEL
1900 B.C. (DALES)
LOTHAL A
PHASE IV
2000–1900 B.C.

Fig. 26

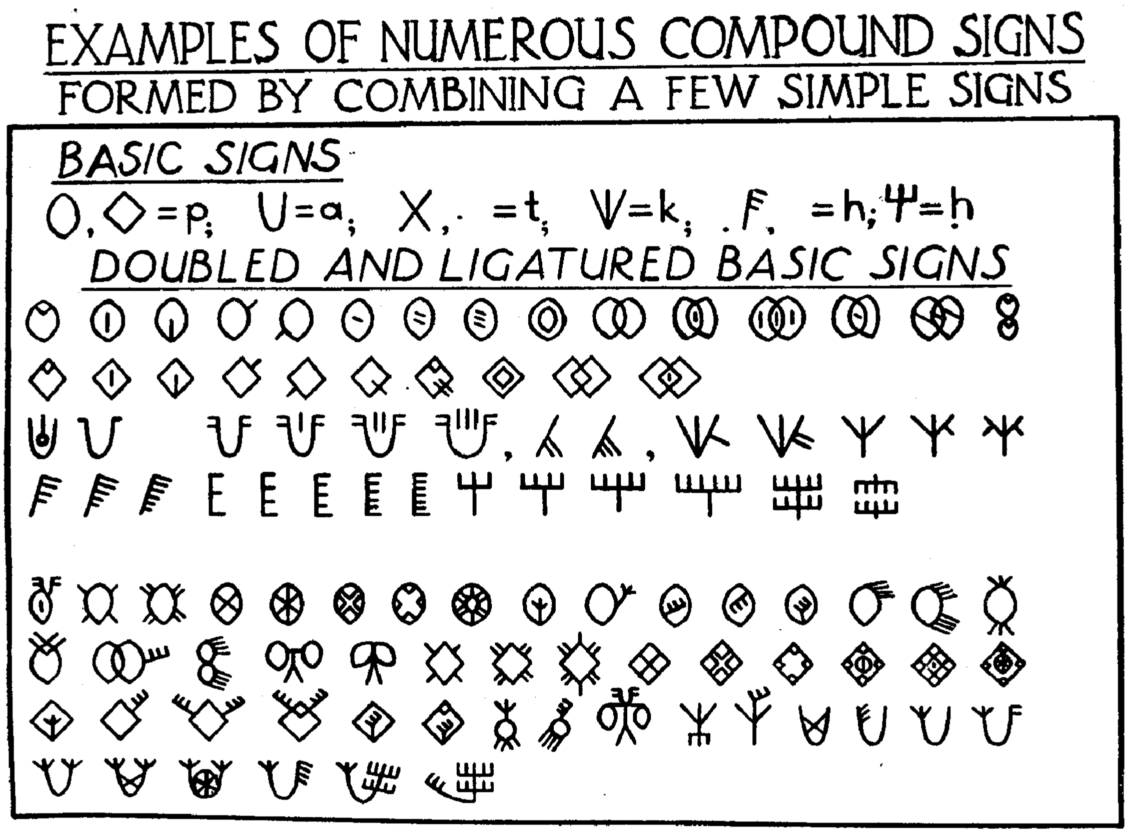


FIG. 27

For identification of all basic linear signs see fig. 28. For explanation of the process of combining basic signs see figs 31A to 32B.

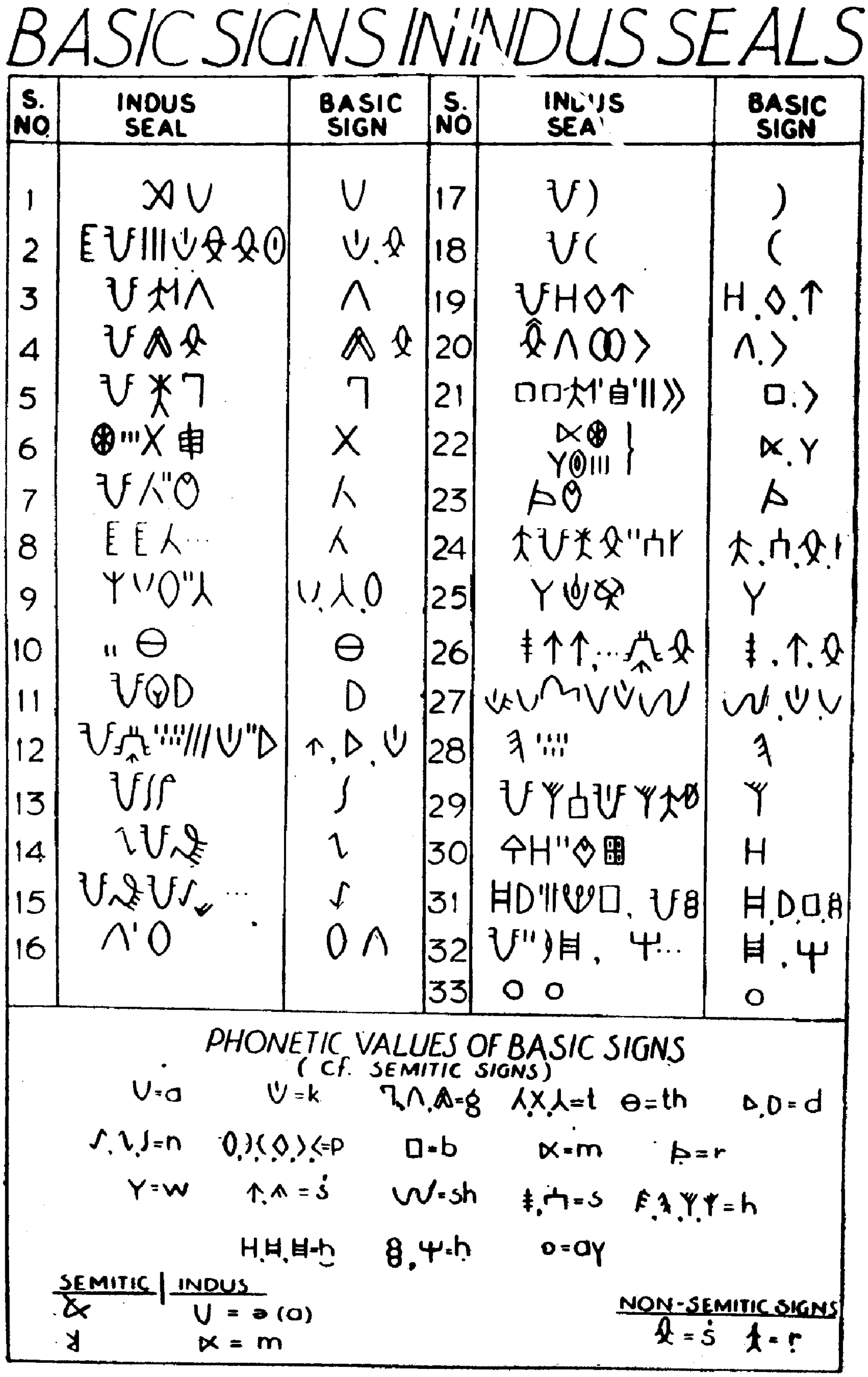

BASIC SIGNS IN INDUS SEALS
S. NO
INDUS SEAL
BASIC SIGN
PHONETIC VALUES OF BASIC SIGNS
(Cf. SEMITIC SIGNS)
SEMITIC
INDUS
NON-SEMITIC SIGNS

FIG. 28

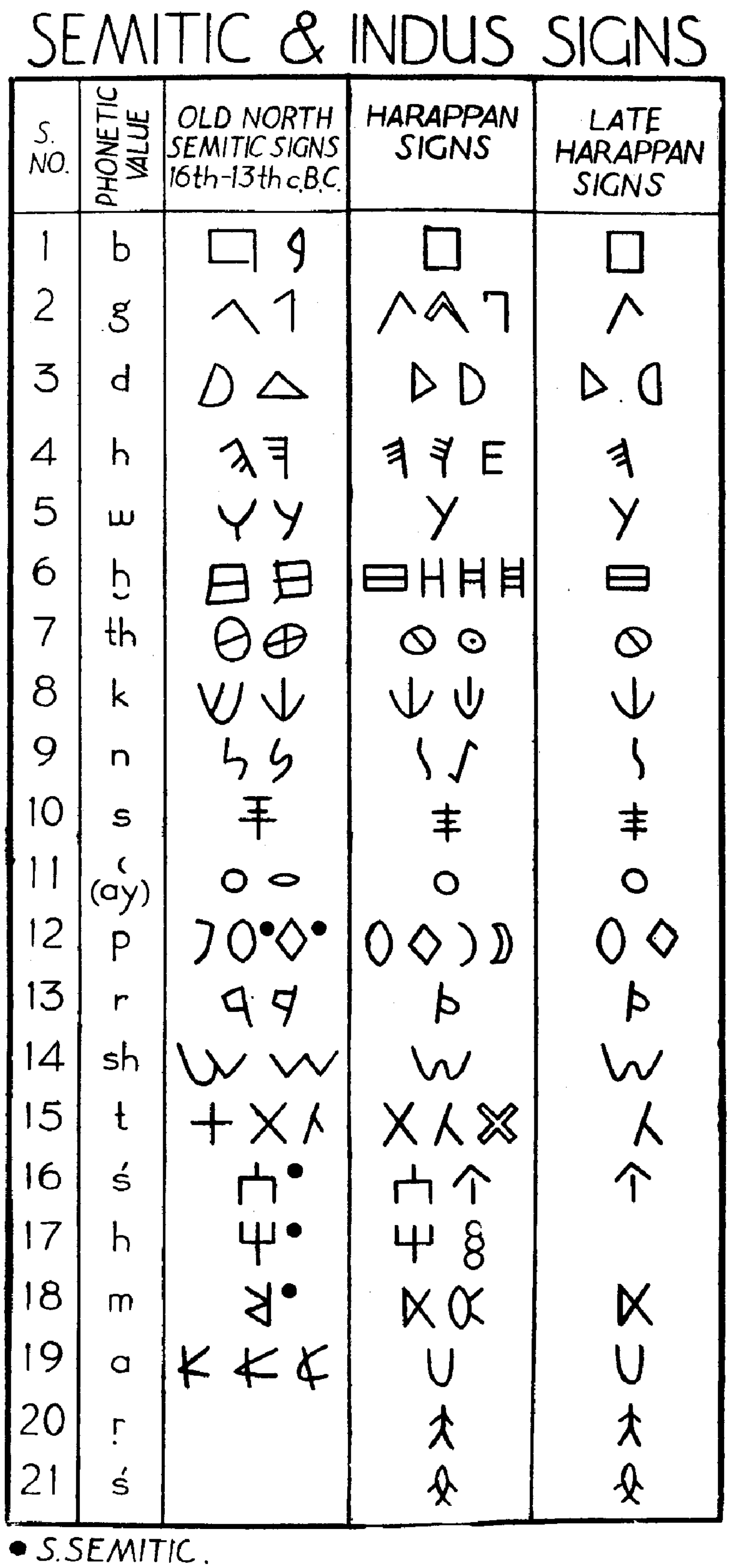

SEMITIC & INDUS SIGNS
S. NO.
PHONETIC VALUE
OLD NORTH SEMITIC SIGNS 16th-13th c.B.C.
HARAPPAN SIGNS
LATE HARAPPAN SIGNS
1 b
2 g
3 d
4 h
5 w
6 ḫ
7 th
8 k
9 n
10 s
11 ʿ (ay)
12 p
13 r
14 sh
15 t
16 ś
17 h
18 m
19 a
20 ṛ
21 ś
• S.SEMITIC.

FIG. 29

devoid of short strokes are considered as basic forms provided they fulfil another condition, and that is, they must occur with one or two other signs. A solitary graffito is likely to be mistaken for a potter's mark although a solitary sign on Indus seals is meaningful.

5. By an intelligent combination of different basic signs or by doubling the same sign and adding strokes (fig. 27) or by adopting both the methods the Harappan scribes could draw several sophisticated forms which look like pictures (fig. 32B).

6. The Indus Script was not static throughout its existence from 2500 B.C. to 1600 B.C. and later. Attempts at simplification of the script and economy in the use of signs were made in later levels of the Harappa Culture at Mohenjodaro and Lothal (fig. 26) by dropping pictures of living and non-living beings and evolving a few of them into linear ones. Another method was to omit alternate (or additional) signs which were in vogue in the mature Harappa period (fig. 29, col 5).

7. The direction of writing is from right to left. The writing is boustrophedon when two or more lines are inscribed[1].

B. Assigning value to Indus signs

1. *First stage*

After ascertaining the basic signs one has to face the difficult task of assigning a particular value to a particular sign. Since the number of basic signs including pictures of 'bird', 'scorpion', 'pipal leaf', 'field', 'hill' etc. was only 52 in the Harappan Script and 20 in the Late Harappan Script it is obvious that the writing could not have been pictographic or logographic. It was either syllabic or alphabetic or a mixture of the two. All the basic signs including most of the pictures had been phonetized. This fact is clearly indicated by the addition of short strokes for 'vowel value' in the case of all linear signs and also pictures of 'man', 'fish', 'scorpion' and 'pipal leaf'. The use of similar vowel-helpers continued in later days also, as for example, in Brāhmī and Kharoshṭhī inscriptions of the Mauryan and later times. Obviously the Indus signs had attained a phonetic value. Parpola, Knorozov and Mahadevan who presume that the writing was pictographic or logographic and that the language was Dravidian have assigned a word value or a picture value to most of the signs[2]. According to Pran Nath the language was Sanskrit. He assigned values accordingly. Such presumptions have resulted in sacrificing objectivity. The clue to the language should be provided by the structural analysis of the script and values should be assigned on some convincing basis. No doubt the Soviet and Finnish scholars have carried out the structural analysis by using computers, but the analysis done by them was limited to the frequency of occurrence of signs and their *interse* position. Analysis of ligatures would have revealed the basic signs, and the stage of development of the Indus writing.

To assign a phonetic value to a sign I have taken the simplified Late Harappan Script as the starting point because as many as 16 out of 20 (excluding alternate signs of basic signs of the Indus script are identical with those of an almost con-

[1–2] Referenc at the end of the Chapter.

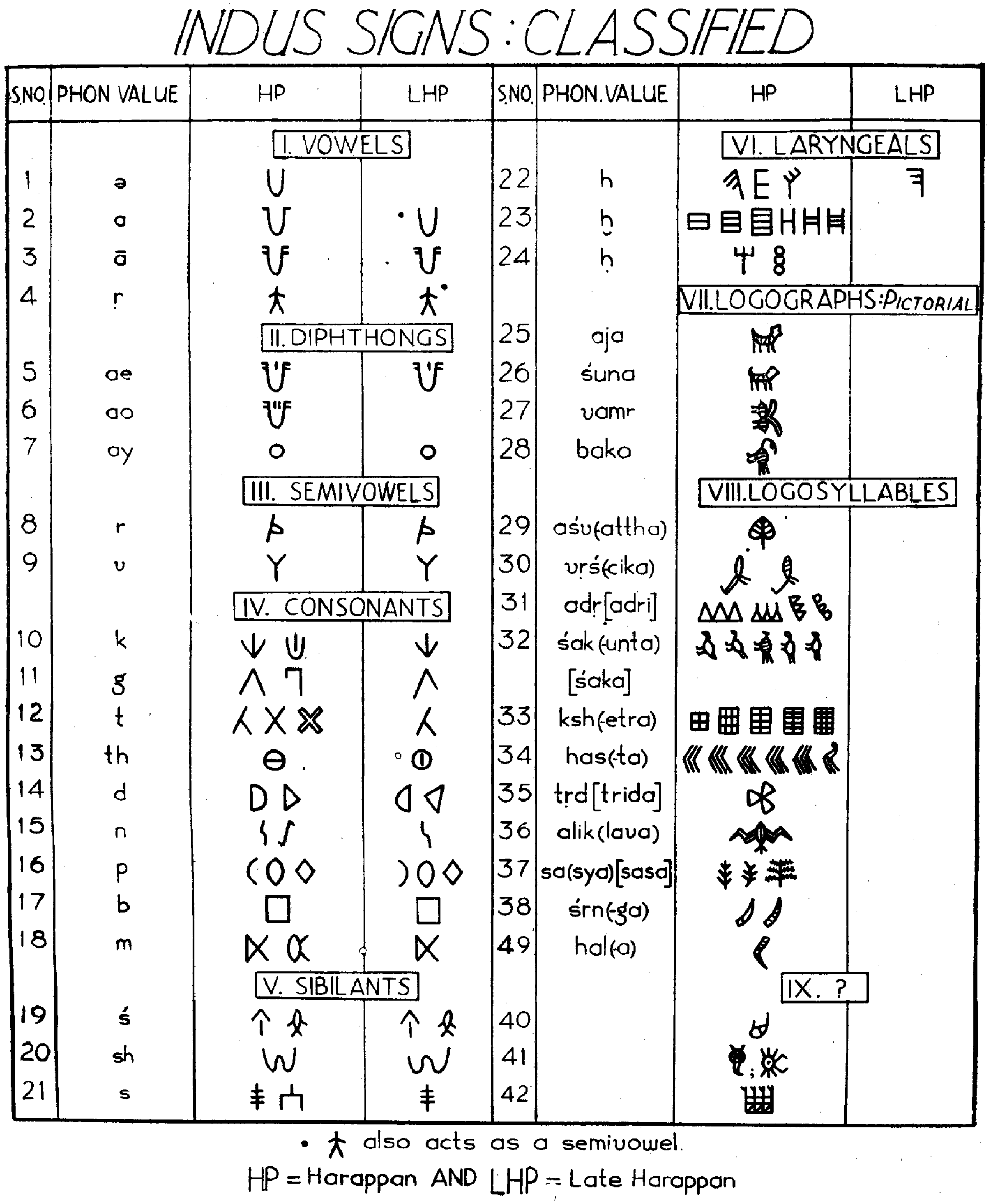

INDUS SIGNS : CLASSIFIED
S.NO. PHON VALUE HP LHP S.NO. PHON. VALUE HP LHP
I. VOWELS
1 ə
2 a
3 ā
4 ṛ
II. DIPHTHONGS
5 ae
6 ao
7 ay
III. SEMIVOWELS
8 r
9 v
IV. CONSONANTS
10 k
11 g
12 t
13 th
14 d
15 n
16 p
17 b
18 m
V. SIBILANTS
19 ś
20 sh
21 s
VI. LARYNGEALS
22 h
23 ḫ
24 ḥ
VII. LOGOGRAPHS: PICTORIAL
25 aja
26 śuna
27 vamr
28 bako
VIII. LOGOSYLLABLES
29 aśv(attha)
30 vrś(cika)
31 adṛ[adri]
32 śak(unta) [śaka]
33 ksh(etra)
34 has(-ta)
35 tṛd[trida]
36 alik(lava)
37 sa(sya)[sasa]
38 śrn(-ga)
49 hal(-a)
IX. ?
40
41
42
• also acts as a semivowel.
HP = Harappan AND LHP = Late Harappan

FIG. 30

temporary script namely the Semitic which is already deciphered. It provides a reliable basis for assigning the phonetic value to the Late Harappan signs because more than 75% of the signs in the two groups are identical. Though it may be argued that identity of signs need not imply identity of value, it is safer to proceed from the known (Semitic) to the unknown (Harappan) than attempting to read inscriptions on the basis of a preconceived notion about the language spoken by the Harappans.

It will be seen from fig. 29 (*1* to *17*) that in addition to 17 signs there are two other signs which show a fairly close resemblence to the Semitic signs namely 18 and 19 which are given the value and *am* respectively. (fig. 29, *18-19*). The additional Harappan signs for *h* and *m* are variants of corresponding Semitic signs.

In the first instance, 56 Harappan and Late Harappan inscriptions which contain only 17 signs identical with the Semitic ones are read. Twentyfour of them are illustrated in fig. 33 (*1* to *24*) and the rest in the monograph[1]. In spite of the identity of phonetic values a distinguishing feature of the Harappan and Late Harappan scripts is the use of vowel-helpers with consonantal signs which the Semitic writing did not adopt. For sometime the early Harappans too seem to have used vowelless consonants, but soon they used short 'storkes' for medial vowel signs with the basic Indus signs and an independent U sign for initial vowel (fig. 33, *25-27*). The use of strokes for vowels has continued to this day in Nāgarī writing. The second distinguishing feature of the Indus writing namely the formation of conjuncts (consonant + consonant + vowel) has also survived in Indian scripts.

The reading of fiftysix Indus inscriptions containing signs identical with the Semitic signs has given a number of meaningful phonemes arranged systematically. eg. *pa* + *ra* (*rā*) = *para* (*ā*), *śa*+*da*=*śada*, *ś* (*sa*) +*ha*=*śaha* (*sah*), *pa*+*t* (*ta*) =*pat* (*ta*), *t*+*r*+*a*=*tra* to form roots etc. The Harappan words *pa* (*pā*) 'protect/protector'; *pat/pata*, 'govern/protected', *sah-pata* 'victorious governor (or victorious (and) eminent'), *bada* (*bhada*) 'praised' (from *bhand*), *rha* (*arha*) 'able', *para* 'supreme or beyond' *ra* (*rā*) 'bestow (bestower) or grant (one who grants)' *da/dā* 'give' and *sāś* = *śās* 'rule (ruler) or command (commander)' are used as roots and nouns in the same sense in the *Rigveda* also. Some Harappan syllabic signs such as *pah* 'protect' and *pag* 'strong' are used in the same sense in other Indo-European languages also. For example, *pah* in Hittite means 'keep oath, protect'[2] and *pag* in Indo-European conveys the sense of 'strong'. The formation of nouns *pag-da* 'giver of strength' and *phah-ra* (*pah-ra*)/*pa-r* (*pa-ra?*) 'bestower of protection' reminds us of the use of certain suffixes to roots in the *Rigveda*. Another feature of the Indus writing is the use of double voiceless stops eg. *ppaka* (*paka*) 'honest', *ppa* (*pa*) 'protect/protector', *ppra* (*pra*) 'great' śakka 'mighty' etc for stress.

There are some words ending in *ha* eg. *ppakaha*, *ppataha* wherein the suffix *ha/h* seems to have been used as an inflexional ending. This aspect is examined elsewhere (below p. 187). It was replaced by *s/as* in the *Rigveda*.

[1] Rao, S. R, *Decipherment of the Indus Script* (in press).

[2] Sturtevant E. H. and Hahn E. A. *A comparative Grammar of the Hitlita Language* (New Haven, 1951) p. 47.

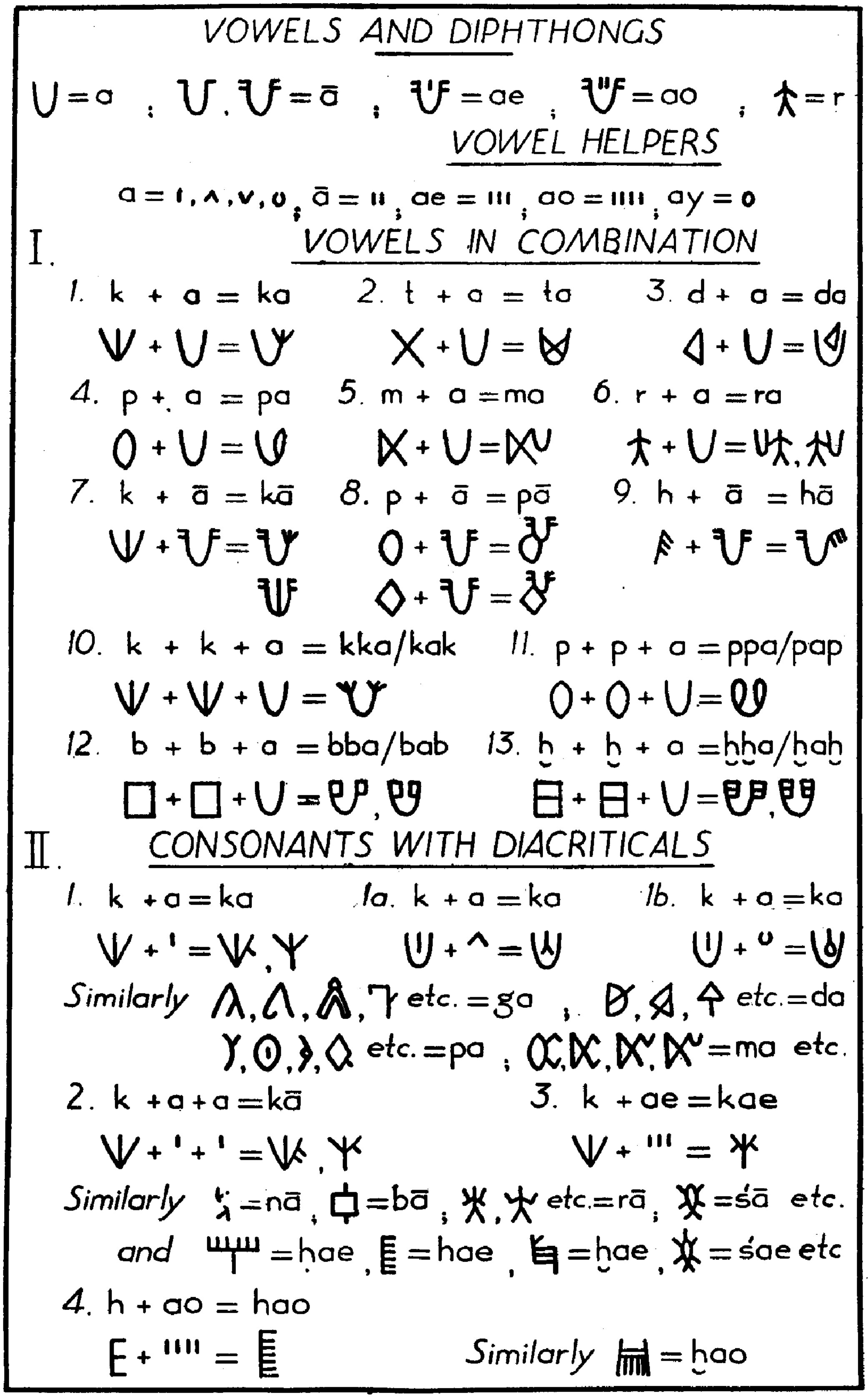

VOWELS AND DIPHTHONGS
=a ; =ā ; =ae ; =ao ; =r
VOWEL HELPERS
a = ; ā = ; ae = ; ao = ; ay =
I. VOWELS IN COMBINATION
1. k + a = ka
2. t + a = ta
3. d + a = da
4. p + a = pa
5. m + a = ma
6. r + a = ra
7. k + ā = kā
8. p + ā = pā
9. h + ā = hā
10. k + k + a = kka/kak
11. p + p + a = ppa/pap
12. b + b + a = bba/bab
13. ḫ + ḫ + a = ḫḫa/ḫaḫ
II. CONSONANTS WITH DIACRITICALS
1. k + a = ka
1a. k + a = ka
1b. k + a = ka
Similarly etc. = ga ; etc. = da
etc. = pa ; = ma etc.
2. k + a + a = kā
3. k + ae = kae
Similarly =nā, =bā ; etc. = rā ; =śā etc.
and =ḫae, =hae, =ḫae, =śae etc
4. h + ao = hao
Similarly =ḫao

Fig. 31A

Mention should also be made of the use of one short stroke between *g* and *p* in two inscriptions (fig. 33. *1-2*), as also between *pat* and *ppat*. It serves the purpose of a word separator. This is true also of two short storkes used between *pa* and *baka* (fig. 33, *15*). *Pa,* an epithet or title applicable to *Baka* is separated by short strokes in the inscription. It may be recalled that *Baka* is the name of a sage (*ṛshi*) with the patronymic Dalbhi or Dālbhya referred to in the *Kāṭhaka* and in *Chāndogya Upanishad.* Later it was applied to an *asura.*

It has been possible to read another set of fifty seven inscriptions in which two more signs, one for *a* and its variants (*ā*, *ae*, *ao*) and the other for *m* occur. Twentyone of them are listed in fig. 33 (*25-45*). The basic sign U had the value *a* of zero degree while its modified forms had the value of an open *a* and of *ā* respectively. With the addition of further strokes it attained the value *ae* and *ao* (fig. 31A) respectively. To the question whether the diphthongs could have existed without the vowels *e* and *o*, the answer is 'yes'. These signs might have stood for the vowels *e* and *o* and the diphthongs *ae* and *o* as well. Similarly, the auxiliary sign which is given the value *ay* at times stood for *i* also, eg. *śayvva*=*śivva* =*śiva* etc. All that can be said at present is that there were no distinct signs for vowels and diphthongs though their distinct pronounciation might have been known. The values *ae* and *ao* given to two signs can be verified independently with reference to the words *aeka* and *aoma* (fig. 33, *39*) written distinctly in the alphabetic system.

From the second set of 57 inscriptions it can be concluded that both *pa* and *pā* 'protect', *g* and *gā* 'sing' were used as roots and nouns. Secondly, unnecessary doubling of signs was not confined to voiceless stops (fig. 34A). It was resorted to for emphasis in all cases, which explains writing *ppra* for *pra*, *ppaka* for *paka*, *bākka* for *baka*, *śayvva* (*śivva*) for *śiva*, *ppat* for *pat*, *aokka* for *oka* and *mhhaha* for *maha* or *mahah.*

As in the *Rigveda* the roots could function as nouns in the Harappan language also. Some examples common to both are noted here.

1. *pa(pā)* 'protect/protector' (RV).
2. *da(dā)* 'give/giver' (RV).
3. *rā* 'bestow/bestower' (RV).
4. *pat/pata* 'govern/governor'. (In RV *pata* 'governed').
5. *śah/sah* 'conquer/conqueror' (RV).
6. *pṛ (ppṛ)* 'rescue, promote, protect/protector' (RV).
7. *dah* 'destroy, destroyer' (RV).
8. *sāś (śās)* 'rule/ruler, command/commander' (RV).

Clues to Harappan language

The salient features of the Harappan and Late Harappan scripts and language as revealed by the structural analysis of 113 inscriptions read in the first stage (of which 45 are listed in fig. 33) are noted below.

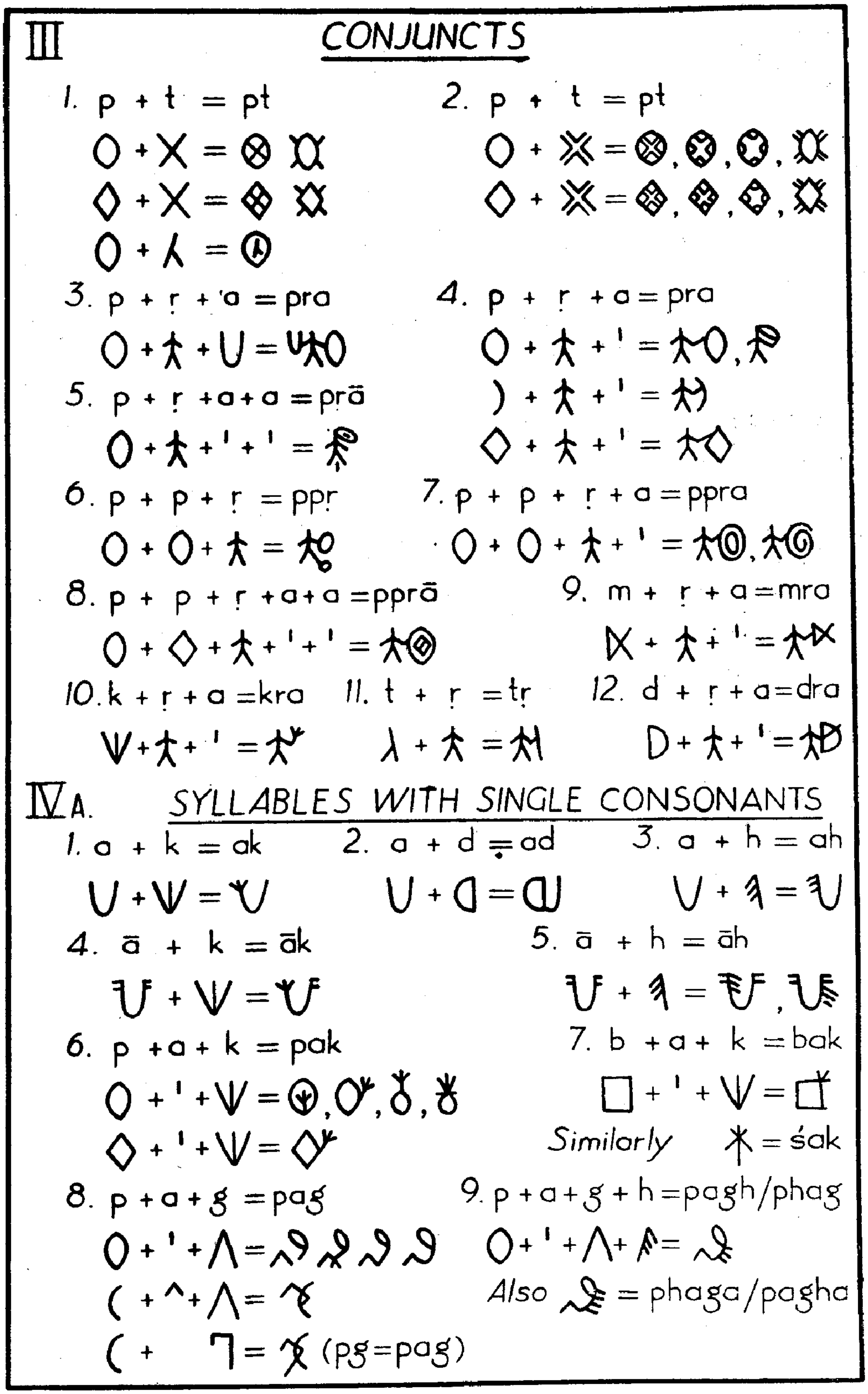

III CONJUNCTS
1. p + t = pt
2. p + t = pt
3. p + r + a = pra
4. p + r + a = pra
5. p + r + a + a = prā
6. p + p + r = ppr
7. p + p + r + a = ppra
8. p + p + r + a + a = pprā
9. m + r + a = mra
10. k + r + a = kra
11. t + r = tr
12. d + r + a = dra
IV A. SYLLABLES WITH SINGLE CONSONANTS
1. a + k = ak
2. a + d = ad
3. a + h = ah
4. ā + k = āk
5. ā + h = āh
6. p + a + k = pak
7. b + a + k = bak
Similarly = śak
8. p + a + g = pag
9. p + a + g + h = pagh/phag
Also = phaga/pagha
(pg = pag)

FIG. 31B

1. In addition to the signs for sounds *k, g, t, th d, n, p, b, m, r, v, ś, sh, s, h,* h, *ḥ* (kh) and *ay* which are common to the Semitic alphabetic system also, the Indus script had signs for *a, ā, ae* and *ao.* Presently we shall see that it had a sign for vowel *ṛ* also.

2. The frequently occurring Harappan syllables *pa/pā* 'protect', *pat* 'govern', *śās* 'rule', *sah* 'overcome, conquer', *da(dā)* 'give', *rā* 'bestow', *pṛ* 'protect', *tra(trā)* 'save' which were used as roots as well as nouns agree in semantics with those used in the *Rigveda.*

3. The Harappan nominal stems were derived by the addition of a suffix such as *a, t, r* etc. to a root. In the *Rigveda* too similar suffixes were added.

4. The Indus script had three laryngeals, namely *h,* h and *ḥ* (kh) as in Hittite, but the Rigvedic language had dropped the voiceless laryngeals and retained only the voiced one.

5. The words *pah* and *pahh* 'protect' were used in the Harappan language in the same sense as in Hittite.

6. In Hittite and Harappan writings the sibilants *ś, sh* and *s* were used indiscriminately, eg. *sāś* and *saś* for *śās.* The likelihood or otherwise of *śaś* standing for *śaśa 'hare'* instead of the root *śās* 'rule' is discussed elsewhere.

7. The exchangeability of voiced and voiceless stops *p* and *b, k* and *g,* and *t* and *d* is noticed in the Harappan language. As the Hittite cuneiform script did not have separate signs it doubled the voiced stop for indicating the voiceless stop while the Harappans did so for stress only.

8. The use of unnecessary vowels is common to Hittite and Harappan writings.

9. Formation of ligatures by combining two or more basic signs with a view to derive syllables eg. *pah, pak (ppak), pav (ppav), śaś* etc. and to form conjunct consonants eg. *pṛ, pra(ppra), ṛka (arka), dṛh* etc. is peculiar to Indus, Brāhmi, Kharoshṭhī and Nāgarī scripts. Formation of such conjunct consonants is not known in Tamil language.

10. Whereas the Indus script (Harappan and Late Harappan) used separate signs to distinguish between *p* and *b, k* and *g,* and *t* and *d,* Tamil has no distinct signs for the voiced and voiceless stops.

11. There are no signs for the retroflex sounds *ṭ, ṭh, ḍ, ḍh* and *ṇ* in Indus writing. They were introduced five hundred years later. The aspirates of *k, g, d, p* and *b* were indicated by adding a laryngeal sign in Indus script.

12. As we shall presently see, the vowel *ṛ* and semivowel *r* were distinguished in the Harappan language by using two different signs, whereas Tamil made no such distinction.

13. The Harappan script used detached vertical strokes for indicating numerals (fig. 35A), but Tamil has no numeral signs.

It is essential to stress here that I have not read the inscriptions in fig. 33 on the presumption that the language is Sanskrit. It is the analysis of the Harappan language of 113 inscriptions which suggests its affinity with the Indo-European languages especially the Vedic Sanskrit, rather than with Tamil. It is an inflexional language in which mostly suffixes are used. E.g. *Pak-ae-baka-ā.*

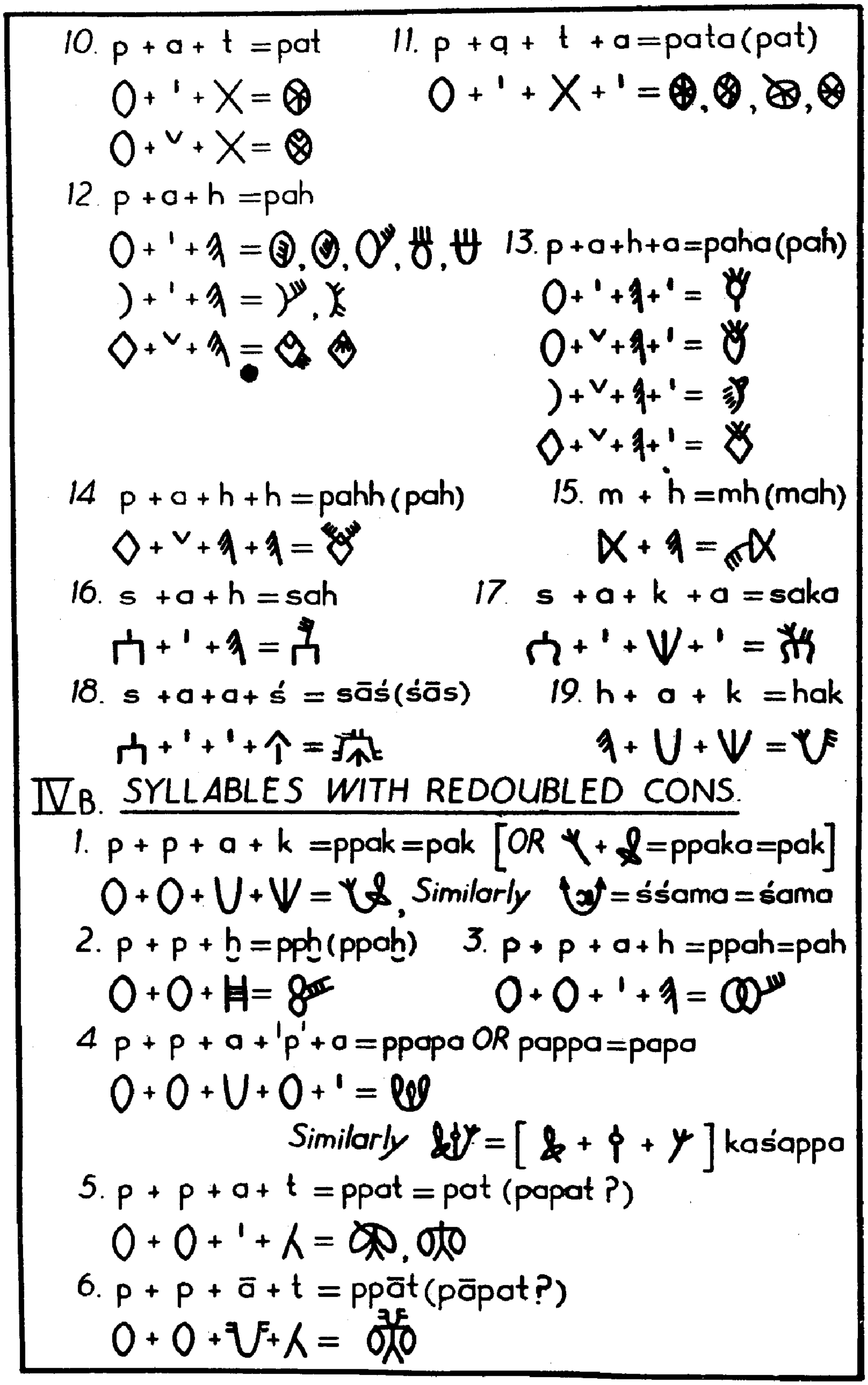

10. p + a + t = pat
11. p + a + t + a = pata (pat)
12. p + a + h = pah
13. p + a + h + a = paha (pah)
14. p + a + h + h = pahh (pah)
15. m + h = mh (mah)
16. s + a + h = sah
17. s + a + k + a = saka
18. s + a + a + ś = sāś (śās)
19. h + a + k = hak
IVB. SYLLABLES WITH REDOUBLED CONS.
1. p + p + a + k = ppak = pak [OR + = ppaka = pak]
Similarly = śśama = śama
2. p + p + h = pph (ppah)
3. p + p + a + h = ppah = pah
4. p + p + a + p + a = ppapa OR pappa = papa
Similarly = [+ +] kaśappa
5. p + p + a + t = ppat = pat (papat ?)
6. p + p + ā + t = ppāt (pāpat ?)

Fig. 32A

2. *Second Stage*

There are two Indus signs which occur frequently but have no parallels in Semitic writing. In view of the fact that 113 inscriptions read in the first stage suggest affinity between the Harappan language and Vedic Sanskrit, one is justified in assigning to pictures of 'man' and 'fish' phonetic values derived from the words used for man and fish in the *Rigveda*, the earliest literary work of India which is almost contemporary with Late Harappan inscriptions (17th cent. B.C.).

The sign for 'man' is given the value *ṛ* from *nṛ (nar)* meaning 'man' in *Rigveda*. This sign had already attained an alphabetic status and was often used as a vowel or semivowel. It is combined with other consonantal signs to form the roots *gṛ* 'sing', *pṛ* 'protect', *kṛ* 'praise', *ṛk (ark)* 'worship' etc. When it was used as a semivowel the length of its vowel-value was indicated by short strokes as in fig. 34A (*46* to *48*). At times it stood for *ar* as in *ark* (p. 200) and *arh*.

As regards the 'fish' sign I must admit that earlier I had given the value *l* from *śakula* or *śahula*, (a variety of fish referred to in the *Rigveda*), but a careful check up of its *inter se* position with other signs has suggested that the phonetic value *ś* from the first syllable of the same word *śakula* would be more appropriate. The words *śāśa, śasa, śada, śaka, śah (ash), śamā, śama* etc. formed by using the 'fish' sign are more meaningful and appropriate than the words *lāla, lala, lada, laka, lah, lamā, lama*, etc. read earlier. The former set corresponds to the words formed by using the 'arrow' sign (*ś* from *śara*), which is an alternate for the fish sign, (cf fig. 33, *11* with fig. 34A, *71* and fig. 33, *35*, with fig. 34A, *81*).

With the assignment of phonetic values to' man' and 'fish' signs it was possible to read nearly 300 more inscriptions which provide sufficient data for further analysis of the Harappan language. Fortytwo of them are listed in figs. 34A and B and the rest in the monograph. The inflexional forms of nominal stems and the use of nominal compounds *(samāsa)* in the Harappan language are now abundantly clear. Further, most of the words used in these inscriptions are etymologically related to those used in the *Rigveda*. Certain verbal forms such as the past participle etc. traceable in the Harappan inscriptions are similar to those used in Vedic Sanskrit. Semantically the Harappan and Vedic words agree to the maximum extent. In phonology too the Harappan language seems to be a precursor of the Vedic language. It is on these grounds that the Indus numeral signs and pictures are given phonetic value derived from words used in the *Rigveda*.

3. *Third Stage*

In the third stage of decipherment the numerals one, two, three, four, five, six, seven, eight, nine, twelve and twentyfour represented by an equal number of short or long strokes are given a word-value. Since we know from the reading of 400 Indus seals that the Harappan language was closely affiliated to Vedic Sanskrit, the numerals are given the value *eka, dve (dva)* etc., but this needed confirmation from other sources. Fortunately

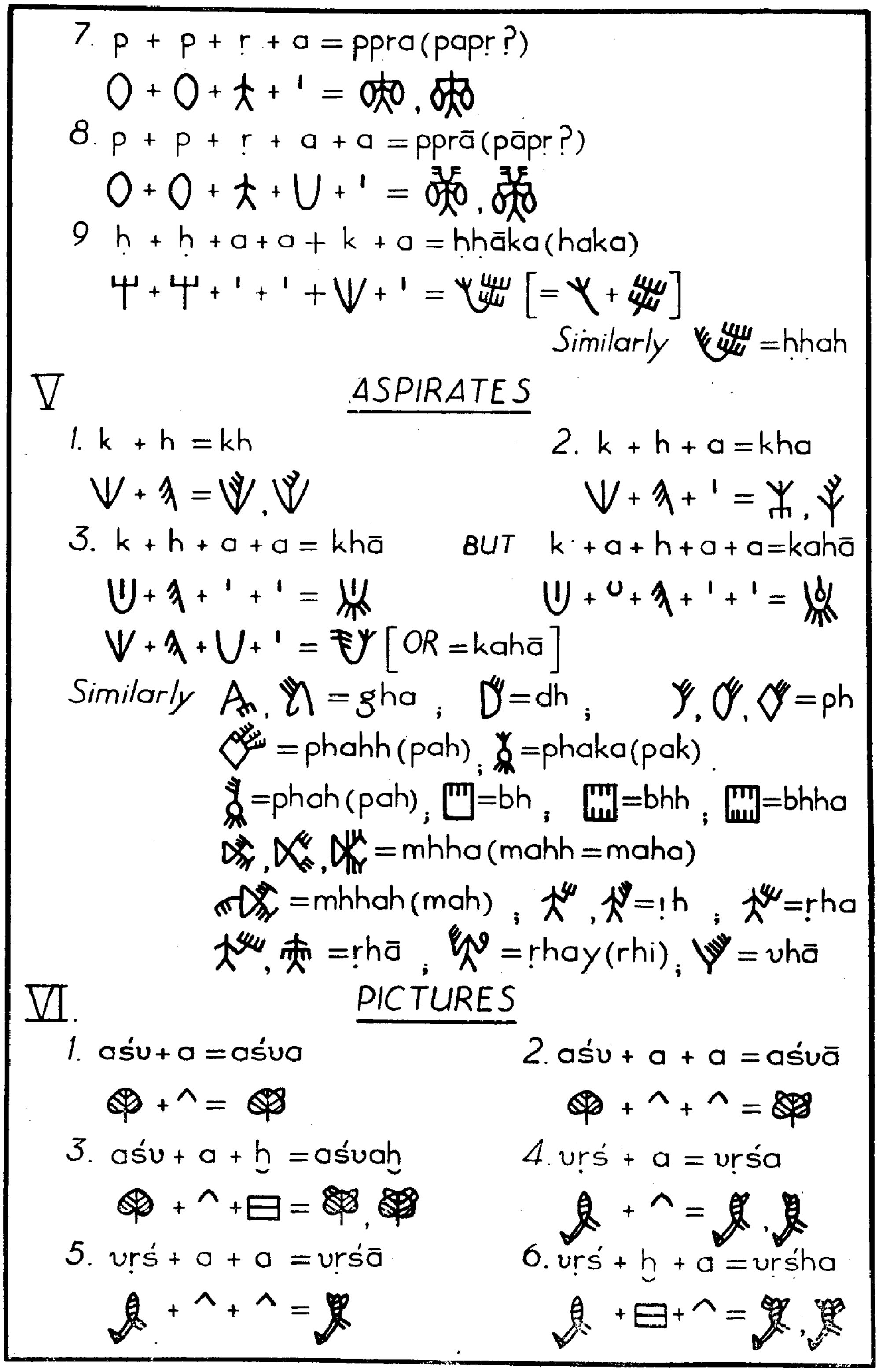


FIG. 32B

Syllables and aspirates formed by joining basic signs (including pictures) and vowel-indicators.

the occurrence of the words *aeka (eka), shash, hapta (sapta), daśa/dasa* and *śat (śata)* which are written in an unmistakable alphabetic system of Indus writing confirms that these words were known to the Harappans and used for rebus writing with phonetic transfer. To quote a simple example the scribe used the numeral sign for three and the alphabet *da* to write (fig. 34A, *105*) *trada* or *tṛda* which conveys the sense of 'saviour' (from *trai* 'save'). It can also be read *trida* 'the triad'. Later, the same logographic sign for *tr (tra)* was written alphabetically thus *t-r-a* (fig. 34A, *49*) or *t-tr-a* (fig. 36B, *6*), or *trā* (fig. 36B, *3a*). Some more examples of numerals employed as logographs are given below:

(1) *eka—ppat* 'singular or chief governor'
(2) *eka*—maha 'singular or (supreme) chief 'or' singular great'.
(3) *eka—pa* 'singular or supreme protector'.
(4) *pat—dyu (dva)* 'governor, divine (heavenly)'.
(5) *para—dyu—nanā* 'supreme, divine Nanā (Mother).
(6) *gara "tr (tra)ka=gara traka"* 'Gara (name of a *ṛshi), the* saviour'.
(7) *panta-pa* 'protector (of the) five'. Originally *Catur=qātr.*
(8) *pa(sapta)ā* 'protector (of the) Seven'.
(9) *ashta-ka* name of a person, or 'consisting of eight'.
(10) *haptvdvippa (sapta dvīpa)*, name of an island.

The logographic use of numerals is illustrated in fig. 35A.

One more inference that can be drawn from the alphabetic system of writing the words *eka, daśa, śat* and *hapta* standing for one, ten, hundred and seven respectively in Harappan language is that the language may belong to the *Satem* branch of the Indo-European family.

4. *Fourth Stage*

In the fourth stage pictures of 'scorpion', 'pipal leaf', 'mountain', 'furrowed field' 'bird', 'goat', 'dog', 'ant' etc. have been assigned phonetic values (fig. 36A). The first three pictures had a syllabic value based on acrophonic principle. They also received vowel-helpers eg. to the 'pipal leaf' motif which had the syllabic value *aśv* from *aśvattha* two other signs, one standing for *a* and the other for *h* were added to write the word *aśvaha=aśvaka* (fig. 32B, *VI*). Similarly, to the 'scorpion' motif having the syllabic value *vṛś* from *Vṛścika* the signs for *h* and *a* were added to derive the word *Vṛsha* 'vigorous' (fig. 32B, *VI*). The picture of 'bird' which had the syllabic value *śak* from *śakuna* (or *śakunta*) was used with other alphabetic signs to form words *śak + a = śaka, śak + ra = śakra* etc. (fig. 36A, *146*).

Most of the pictures which occur frequently in the Indus inscriptions were used as syllables on the principle of the first syllable of the word for which the picture stood. A list of these signs and their phonetic value is given in fig. 36. Alternate words available for the same picture have been taken into consideration before rejecting them as inappropriate.

C. Linguistic analysis and vocabulary

The following inferences can be drawn regarding the structure of the language on the basis of the reading of 1200 seal inscriptions.

1. In the formation of nominal stems from roots by the addition of suffixes, in the declension of nouns and adjectives and in employing nominal compounds *(samāsa)* the Harappan language shows close affinity with the language of the *Rigveda*. The nominative, instrumental, dative, genitive and ablative cases of a number of nominal stems have been identified in Indus inscriptions. Examples:

   1. *baka* (nom), *bakā* (ins), *bakae* (dat), *bakaha* (ab & gen).
   2. *tṛpa* (nom), *tṛpā* (ins.), *tṛpae* (dat.), *tṛpaha* (ab & gen.).
   3. *vṛś* (nom), *vṛśā* (ins.), *vṛśae* (dat.), *vṛśah* (ab & gen.).

2. The retention of voiceless laryngeals namely *h* and *ḥ* in the Harappan language and their absence in *Rigveda,* the frequent use of *r* in Harappan and its replacement by *l* in *Rigveda,* the absence of feminine gender and dual number and the use of five cases in Harappan as against the eight cases in *Rigveda* may suggest that the Harappan language represents an earlier form of the Old Indo-Aryan language used in *Rigveda.*

3. The utter scarcity of space on Indus seals necessitated the formation of compound signs resulting in conjuncts and syllables. For the same reason inflexional suffixes were omitted in the case of all nouns and adjectives except the terminal one while forming nominal compounds eg. (1) *pag-phaga-rā-ha* 'of *(ha)* mighty, bounteous bestower' (2) *sapta-śāsa-rada-dyuha* 'of the divine *(dyuha)* prosperous (*rada* from √*ṛdh* 'to prosper') ruler *(śāsa)* (of the) seven *(sapta)* (3) *śāśa (śāsa) phagaha (bhagaha)* 'of the ruler bountiful'

4. Regional variations in the orthography and use of certain syllables such as *pah/pa phag/pag* can be noticed in the inscriptions. For example, the Harappans in Gujarat used *pa* instead of *pah* 'protect', while in the Indus valley both were in use.

5. A number of words written in the syllabic system in the early and middle Harappan levels came to be written alphabetically in the later phases (fig. 36B). This is further confirmed by the linear alphabetic writing on the seals from the latest levels of Mohenjo-daro (fig. 26)[1]

More than 75% of the Harappan words are semantically identical with those used in the *Rigveda* and a few other Indo-European languages. Some examples are cited here.

Abbreviations used :

Ved.=Vedic; HP.=Harappan; IE.=Indo-European; O.Pers.=Old Persian; O.Sl= Old Slavonic; Hitt.=Hittite; Arm.=Armenian; Gr.=Greek; Skt.=Samskrit; Goth.= Gothic; Lat.=Latin.

1. Ved. *ari*—'devoted, trustworthy'.
   HP. *ara/āra* 'friend'.
   IE. *ara* (Hitt) 'friend, ally'.

[1] Dales G. F: *Samuel Noah Kramer Anniversary* Volume 1976.

2. Ved. *karu* 'singer' (√*kṛ* 'to celebrate').
HP. *kṛ* 'singer' or 'praiseworthy'. *Kuru* (RV) seems to have come from *kṛ* (HP).

3. Ved. *bhaga* 'gracious', 'lord', 'patron' applied to gods especially Savitṛ (RV).
HP. *phaga=bhaga=* *bhakka* and *baka* } 'gracious', 'lord', 'god'.
O.Pers *baga* 'god'.
O.Sl. *bogat* (old. Bulg) 'rich'.

4. Ved. *śatem* 'hundred'.
HP. *śat* *śata* } 'hundred'.
Hitt. *sata* 'hundred'.
AV. *śat* 'hundred'.

5. Ved. *eka(aika)* 'one'.
HP. *aeka* 'one'.
AV. *aika* 'one'.

6. Ved. *oma* *(omas)* 'protector'.
H.P. *oma* 'protector, friend'.

7. Ved. *ama* 'protect'.
HP. *ama* 'protect'.

8. Ved. *av* 'to protect'.
HP. *av/va* 'protector'.

9. Ved. *gṛ* 'to praise'.
HP. *gṛ* 'praise', 'sing'.
gara 'one who is praised' (?), 'singer'

10. Ved. *arka* 'god', 'worship', 'sun', 'fire'.
HP. *ṛk/rka* 'to praise', 'sing', *arka* 'sun', 'god'.
IE *erg* (Arm. 'song', *arkuwa* (Hitt) 'plead' or 'pray').
erk 'to sound clearly'.

11. Ved. *ṛksha* 'a bear', also 'name of a person'.
HP. *ṛksha* 'name of a person or people'.
IE. *arktos* (Gr.) 'bear'.

12. Ved. *dāś* 'worship', 'honour god', 'grant' (only finite forms in RV).
HP. *daś/daśa* *dasa* } 'worship. or 'worshipped' or 'ten'.

13. Ved. *kṛp*(a) 'form'.
HP. *kṛp* 'form'.
IE. *gṛp* 'a form', 'corpus', 'body' (Lat.).

14. Ved. *bhadra* 'auspicious', 'blessed'.
HP. *bhadra* *bhādra* *badra* *bādra* } 'auspicious', 'blessed'.

15. HP. *bhada* } 'good'
bada
IE. *bhad* (Goth) 'god', √*bhand* 'to be greeted with praise (RV).
16. Ved. *hasta* 'hand'.
HP. *hasta*(?) 'hand'.
IE. *ghasto* 'hand'.
17. Ved. *pājas* *(pājah)* 'power'.
HP. *paga*
pagha
pagh
pag } 'powerful, strong'.
IE. *pag* 'to make firm'.
18. Ved. *patra* 'drinking vessel, also means 'protector', from √*pā* 'to protect'.
HP. *patṛ*
pātṛ } 'protector' from √*pā* 'to protect'.
IE. *poi* 'to keep', 'to attend cattle'.
19. Ved. *ṛdh* 'prosper, succeed'.
HP. *ṛdh* 'prosper' (*ṛdhat* 'prosperous' ?).
20. Skt. *pā(pa)* 'protect, protector'.
HP. *pa/pā*
pahhas
pahas } 'protect, protector'.
IE. *pa*
pahs
pahhas
pahhar } (Hitt.) 'protect, keep'.
21. HP. *pap/papa* 'protect'.
IE. *pab/pap* (Hitt.) 'protect'.
22. Ved. *para*
parā } 'beyond, ultimate'.
HP. *para*
parā } 'ultimate' i.e. 'supreme'.
IE. *para* (Hitt.) 'before, forward'.
23. Ved. *chaga* 'goat'.
HP. *śaga* 'goat'.
IE. *śeg* (Hitt.) 'goat'.
24. Ved. *dā* 'bestow, grant, give'.
HP. *da* 'bestow, grant, give'.
IE. *da* (Hitt.) 'take, trim' etc.
25. Ved. *kha* 'cavity, sky, heaven'.
HP. *ḥḥa(kha)* 'heaven' or *ha* 'trustworthy'.
IE. *ḥa* (Hitt.) 'trust'.

26. Ved. *ṛbhu* 'clever'.
HP. *ṛbh* 'clever'.
IE. *rabh* 'vehemence'.

(Note: 1. from the Harappan picture for 'hand' the syllable *has* and the alphabetic sign *h* are derived. 2. Out of sixty Harappan and nominal stems, fifty occur in the *Rigveda*. The comparison with I E words enables us to identify the HP language.)

D. Objections answered

Lal has observed that the material from Late Harappan levels is very limited and hence the conclusion based on it may not be convincing. But it must be remembered that in addition to 20 potsherds from Lothal B and Rangpur II B-III, there are twenty seals from latest levels of Mohenjo-daro[1] and five from Lothal which are inscribed in alphabetic writing noted for its (fig. 26) use of simple linear signs omitting pictures[1]. Another objection raised is that different entities are grouped together and considered as having the same phonetic value. This is not true, for, all the three signs namely , and , which are given the phonetic value *p*, have the same value in Semitic script also and they are functionally identical in Indus inscriptions even when used in conjunct consonants such as *pṛ, ppṛ, pprā* etc. or when they are combined with other signs such as the laryngeal *h*. Had these signs different values Lal would have done well to suggest them. As regards the objection that the trident-like sign (which is given the value *k*) is not the same as the one with a vertical stroke below it as in it should be pointed out that the addition of a stroke to the basic sign can be traced distinctly in several seals. It served as a vowel-helper. A third objection is that the readings *ppra* 'great' and *ppat* 'govern' occurring in Harappan inscriptions are not in 'good Sanskrit'. The doubling of *p* in these cases is for stress or may be due to regional variations in pronouncing the words *pra* and *pat* which also occur in seal inscriptions with a single *p*. All the criticisms mentioned above are of a superficial nature and have been answered.

E. Contents of seal-inscriptions

There is not much room for speculation about the use of Indus seals since we know that they mainly served a commercial purpose. The impression of packing materials on the reverse of terracotta sealings actually used at Lothal suggests that the cargo exported and imported used to be sealed. Sixtyfive of the Lothal sealings were found in the warehouse, and almost half the number of inscriptions on them contain one of the epithets standing for a ruler eg. *sāś* or *śaśa* for *śāsa* 'commander' or 'ruler', *pa* 'protector', *pat* 'governor' etc. One more title such as *śada*, 'eminent', *śaka* 'powerful', *śaha (sah)* 'mighty', *eka* 'supreme' occurs frequently with the epithet for ruler. Occasionally the personal name of the owner was added in the inscriptions. A hierarchy of rulers is suggested by the epithets

[1] Dales, G.F. 'New Inscriptions from Mohenjodaro, Pakistan' in *Kramer Anniversary Volume* 1976 Ed. B. L. Eichler, P. 111 *ff*.

para and *eka* 'supreme' and by the terms *śaśa (śāsa) mahā* 'ruler great', *pra-pa* 'great protector' etc. Some seals mention only *mahā* 'chief' or 'great' and *pa* 'protector'. The use of the epithets *eta* 'brilliant', *bhā (bhha)* 'shining' and *dyu* 'heavenly' suggests that ruler was considered divine.

The subject matter of the Indus seals mentioned below can be compared with that of the early historical seals from Jhusi, Nalanda etc. The examples given here are only illustrative and not exhaustive.

Seals containing

1. Name only	(a) *baka*, name of a ṛshi (Kāṭh) (b) *gara*, name of a person (Tāṇḍya Br.)
2. Name with royal titles	(a) *pra-pa-baka* 'great protector Baka'. (b) *parae-aśva* 'to supreme Aśva'. Aśva is the name of a person (RV).
3. Royal title and administrative unit or place of the ruler	(a) *pah-adṛ-ma-dvippa (dvīpa)* 'protector of the mountain division'. (b) *pa(sapta)ā* 'from protector of the seven'.
4. Name and title indicating divinity	*Bakae-dyu-śaga* 'to Baka (the) divine (and) powerful'.
5. Name of the ruler and the territory or people over whom he ruled.	*Dṛhae-panta-pa* 'to Dṛh (Druh) (the) protector (of the) Five'.

The suffixes *a, ae* and *ah/aha* added to nominal stems in Harappan inscriptions suggest that the seals issued belonged to a particular person, for example, (a) *pat-patae Baka* 'to governor (of) governor Baka' (b) *phagaha (bhagaha)* 'of the Lord' (c) *aśvaha* 'of Aśva' (d) *āt-ha* 'of the bestower' ($\sqrt{}$ *ātan* 'bestow'), *ae-śaśa-baka-ā* 'to ruler from Baka'.

F. Animal motif on seals

The so-called Unicorn which occurs on more than a thousand Indus seals was the most popular animal motif throughout the Indus Empire. It is a composite animal representing the horse, bull and camel, all of which were known to the Indus people. The recent report about the occurrence of horse bones in Surkotada throughout the Harappan phase suggests that the animal might have been domesticated in Kutch which is known to be the habitat of the wild ass, onegar. The Brāhmani bull was popular in the Indus valley but not in Gujarat and Rajasthan. The short-horned bull and elephant are among other domesticated animals engraved on seals in all the provinces. The rhinoceros occurs on seals from Harappa, Mohenjo-daro and Kalibangan, but not Lothal although terracotta models and bones of the animal are found everywhere. The inscriptions engraved on Indus seals carrying the animal device contain words conveying the sense of protector, saviour, bounteous, powerful, virile, eminent, bestower, able, divine, supreme, pure, Lord etc. Secondly, the

life-like representation of animal forms and their majestic stance noticed in seals suggest that the bull, unicorn(?), elephant, goat and rhinoceros were held in reverence. This view is further supported by a scene on a Mohenjo-daro seal depicting an animal being carried in procession. On another seal is a scene suggesting that a lion or tiger has been taken through a gateway. Thirdly, the offering vessell and sacred braziers shown in front of animals are other indications that some offerings were made to them.

From the *Rigveda* we learn that the bull, elephant, goat, lion, horse etc. provided nature's forms to the gods. In fact each animal represented a particular power of god. The Harappans who had concretized the abstract qualities of god and used them as epithets of rulers seem to have laid the foundation of the Rigvedic concept of gods. The epithets *śak* 'powerful', *śad* 'eminent', *vṛś* 'vigorous', *bhadra* 'auspicious', *bhaga* 'bountiful, *pav* 'pure', *eta* 'brilliant' and *bhā* 'shining' are common to gods as well as rulers in Harappan and Vedic religion. We know from the *Rigveda* that some of these qualities of gods were compared to those of the bull, goat and horse. It is not unlikely that the Harappans too had similar concepts. An animal which stood for a particular quality of god seems to have been drawn on the seal because the owner of the seal venerated the god in that form of the animal. Where more than one quality or power of god had to be indicated a composite animal such as the unicorn which is a combination of the horse, bull and camel was drawn. The three-headed animal of Harappa and Mohenjo-daro seems to have represented 3 powers. In most of the Indus seal-inscriptions different powers or qualities of gods which were applicable to the divine beings as well as earthly rulers have been mentioned. Other basic concepts common to the Harappans and Rigvedic people are noted separately (p. 193).

G. Anthropomorphic representations on seals

The inscriptions on other seals containing anthropomorphic forms of gods are read on the basis of values assigned to Indus signs. The interpretative method followed by Ramachandran and others does not help much in deciphering the script. To adjust the reading of the inscription to the interpretation of a scene, mythological or otherwise, is to sacrifice objectivity. Hence I have rejected this method and read the inscriptions on the basis of values assigned to individual Indus signs.

The inscription on a seal from Harappa with only a sacred brazier motif reads *pag-phag-ṛka-ā-ha* 'of mighty Lord *Arka*'. A seal from Mohenjo-daro on which a man sitting on a tree is seen commanding a tiger has an inscription reading *pt (pat)*", *tāra-śa-eka* 'govern (governor)" Tāra powerful supreme' Tāra means 'protector, saviour'. It refers to Rudra (Vaj. S.) also. The inscription on the so-called Paśupati seal reads *ma-tṛd-ao-ś-ā* 'chief *(ma=maha)*, Triad *(trida=tridha)*, shining *(ośā=osha)*'. The horned deity surrounded by animals has three heads perhaps representing a Triad of three gods which in Upanishadic texts stands for 'a high philosophic concept of the Absolute'. The inscription on a seal from Mohenjo-daro in which a three-headed animal is shown is interesting. It reads *dyu-bhha-(śaka)-śa-śa-dyu-ś-k-tṛ-da* 'divine, shining Śaka, Śaśa (Śāsa) divine powerful Triad (or saviour)'. The Triad is suggested by an animal with three heads representing the bull,

unicorn and goat or antelope. The inscription reads "*sapta-Ka*". The question is 'who are these seven'. 'In one of the seals *Ṛksha* 'star' or 'bear' appears. In seal 125 of Fig. 35B the ruler of the 'seven' is considered divine. In Mackay Seal 430, seven devotees are shown below a god who emerge from a bough. They may represent seven *ṛshis* (also called *ṛkhsa*).

H. Basic Concepts of the Harappans and the Rigvedic People

Having noted that the language of the Indus seals has close affinities with that of the *Rigveda* it would be fruitful to ascertain the basic concepts of the Harappans. If their concept of the universe, cosmic order, qualities of gods and men are not different from those of their immediate successors it shows continuity of ideas and not chronological anachronism as presumed by Sankalia[1]. For example, the name Baka read in Indus seals might have been assumed by a *ṛshi* in the Rigvedic period. We are not telescoping later ideas into earlier ones, but only ascertaining whether Harappan ideas continued to be held in the succeeding generations or not.

Indus inscriptions refer to gods and kings frequently and the qualities attributed to them remind us of the qualities of the Vedic gods. They are eminent *(śada)*, powerful *(śaka)*, auspicious *(bhadra, śiva)*, pure *(pav)*, gracious *(maha=makha)*, bountiful *(bhaga)*, full of vitality *(Vṛśas/Vṛsha)* and brilliant (*eta* and *bhā*). God was sought by the Harappans for affording protection which accounts for the frequent use of the terms *pa (pā)*, *pah (pahhas)*, *tṛa*, *tṛ-da*, *trata (trāta)*, *ama* etc. He is also a friend *(oma)* and helper *(śāka)*. He is no doubt supreme *(para)* and unique *(eka)*. He was trustworthy (*ha* 'trust' cf. *ha* in Hittite language). Only once he is referred to as *śatṛ-tra* 'protector from the enemy' in the Indus inscription, perhaps because the Indus people had no human enemies to be protected from, but they were to be saved from natural calamities. The agents of nature namely, fire and sun, *ṛka (arka)* were beneficial to man and therefore considered by the Harappans and Rigvedic people as god.

In the *Rigveda* the hymns suggest that various deities are but different forms of a single divine being. The Harappan seals also mention *tr-daśa* corresponding to thirty gods of the *Rigveda* (later raised to 33), but the idea of a single supereme god was predominant among the Harappans as is evident from the use of the terms *eka* 'unique, singular' and *para* 'supreme' in Indus inscriptions. The Vedic gods had a beginning. In an earlier age they were not immortal according to the *Rigveda*. Perhaps they were human. It may be noted here that the names of great persons occurring in the Harappan seals are the same as those of the great seers and poets mentioned in the *Rigveda* e.g., Atri, Kaśappa, (Kaśyapa), Gara, Sasa, Barhi etc. Names such as Śakra, and abbreviations Ka (for Prajāpati) and Ga (for Bṛhaspati) remind us of Vedic gods. Abstract qualities concretised by Harappans are taken by Vedic poets as referring to god e.g. *bhaga, makha, daksha* etc. The concept of mother was well known to the Harappans. The epithets associated with Nanā, the 'mother', in the Harappan seals are 'divine' *(dyu)*, 'supreme' *(para)* etc. The fact that the Mother goddess figures have been found in the Indus valley may tempt us

[1] Sankalia H. D. (1974) *op. cit*

to infer that Nanā was the name of the Mother Goddess. She was divine and supreme. Whatever be the purpose of producing terracotta female figures in the Indus valley, one thing is certain namely, the *Rigveda* and Harappan seal-inscriptions revered *Nanā.*

The Harappan seals mention *ksha* and *kshama* by which terms the 'earth' is meant in the *Rigveda.* The sign of field, *(kshetra, kshatra)* is used for the syllable *ksha* in the Harappan inscriptions. Hence it is likely that the concept of 'earth' was foremost in the mind of the Harappans when they wrote on seals epithets such as *ksha-tra* 'saviour of the earth'.

The heaven, air and earth formed the favourite triad of the *Rigveda,* and sometimes the fourth one added to it was 'the world of light'. It is not clear whether the three worlds namely heaven, air and earth were meant by the term *tṛka=trika* 'consisting of three' (RV) used in the Harappan inscriptions. The occurrence of the word *tṛ-da=trida (tridha)* 'triple' on a seal with a three-headed animal figure and again on the seal with a three-headed deity (Paśupati ?) may be taken to refer to the Triad.

The Harappans recognised the cosmic 'order' just as the Rigvedic people did. Both used the term *ṛta* in the sense of 'order' or 'course' of nature which was applied in the *Rigveda* to 'truth' for order in the moral world, and for 'sacrifice' in the religious world.

The origin of the Rigvedic idea of giving a concrete form to an abstract quality such as ability, strength, immortality, honesty, generosity, knowledge etc. can be clearly traced to the Harappans. The words *daksha (dhaksha)* 'skill', *śak (śaka)* and *śaha* (*śah* and *sah* also) 'mighty, powerful', *pag* 'strong', *ṛta* 'order, truthful', *vṛś* 'manly, vigour', *phaga (bhaga)* 'bountiful, gracious', *eta* 'brilliant', and *bha* 'shining' occur very frequently in HP seals. The Rigvedic gods are sons of some of these qualities. For example Agni is the son of strength. In this connection attention may be drawn to seal no. 307 (Vats) with an inscription reading *pagh-rā* 'bestower of strength'. It carries the scene of a horned deity standing in an arch formed by *aśvattha* leaves. He may represent Agni. If the same inscription is read *phag-rā* (*=bhag -rā*) it means 'bestower of bounty' or or God Rā.

Before concluding this chapter it is necessary to make a brief reference to the "decipherment" attempted by Finnish scholars led by Asko Parpola and Soviet scholars led by Yu. V. Knorozov. In their booklet *Further Progress in the Indus Script Decipherment* (Copenhagen, 1970) A. Parpola and others have furnished a list of deciphered signs (pp. 41-44). They have given a word value to both linear signs and pictures and arrived at the homophone intended. These signs and pictures are said to be 'indicative of "plural" "genitive plural" "chief", etc. They have assigned word values in Dravidian to some signs instead of assigning phonetic values to them. In their latest publication *Materials for the Study of the Indus Script* (Helsinki 1973) Seppo Koskenniemi, Asko Parpola and others have made arbitrary cuts in inscriptions and grouped the signs into pairs. The computer does not indicate analysis of ligatures into basic signs. The Soviet scholars have in their publications *Proto-Indica* (Moscow 1968 and 1973) taken ligatures as pictures of 'bowman' 'club man' etc., and given word value in Dravidian, the latter being named *Yamaī.* Such identifications have no basis. Both Soviet and Finnish scholars have proceeded on the assumption that the script was not syllabic or alphabetic. Further their preconceived notion that the language was Dravidian has prevented them from examining other possibilities. Recently a suggestion was made to the present writer that by taking a group of signs certain arbitrary

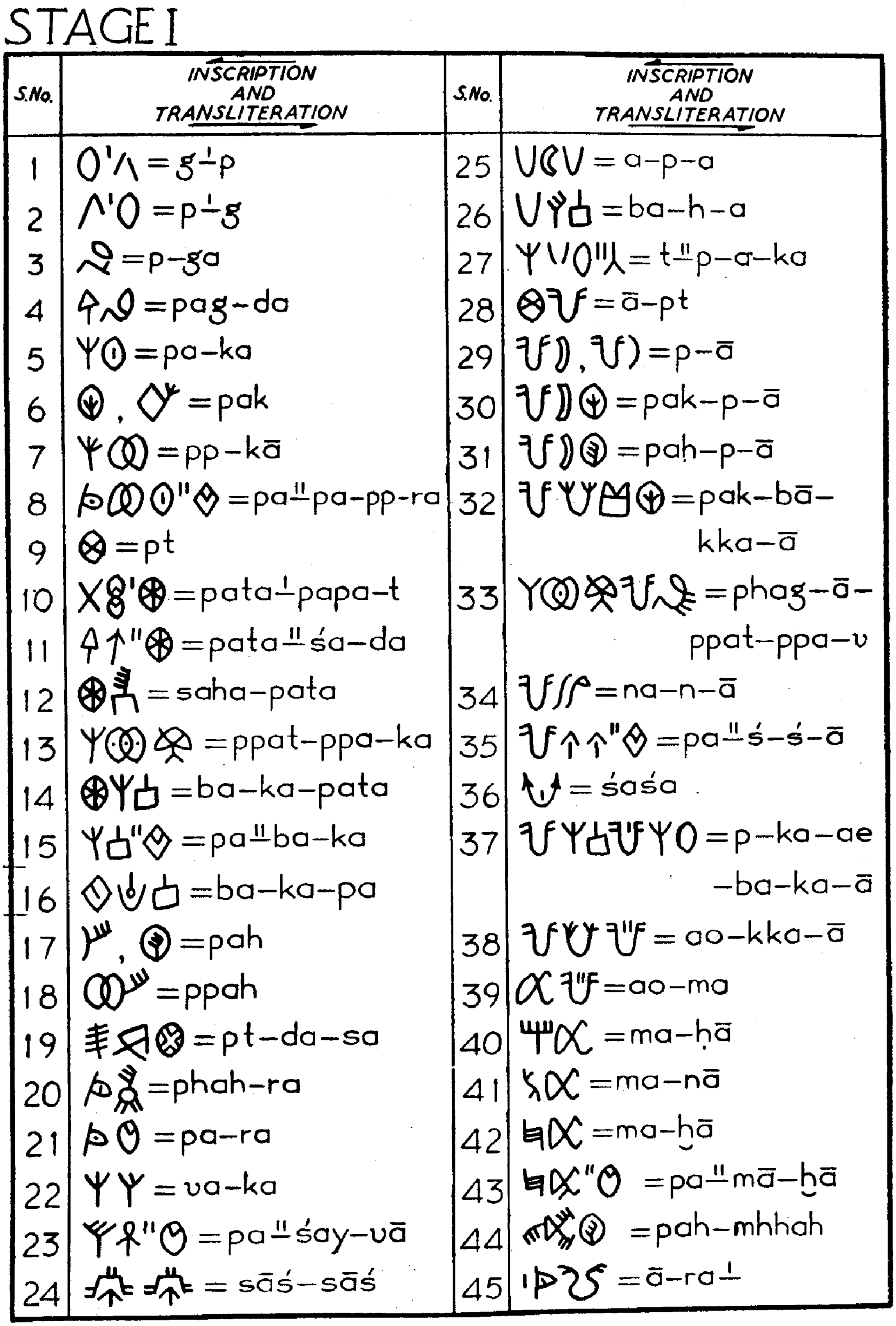


FIG. 33

Note : For transliteration of transcription given above see page 196 *ff*.

values may be given to them and the meaning they convey may be shown as the same in any language presumed. This is what Heras, Mahadevan, Parpola and Knorozov have done. Such efforts are futile unless the basic signs in Indus script and the stages of its development are determined and phonetic values are assigned on a known basis, as has been done by the present writer.

As the language of the Indus seals is found to be the forerunner of the Old Indo-Aryan (Rigvedic), it may suggest that at one time the Old Indo-European language with such variants as the Hittite and Harappan was spoken over an area extending from the Oxus river to the Indus valley on the one hand and upto North Syria on the other. This is not to say that all those who spoke this language belonged to the same race although we know that in Indus cities there lived a large group of people ethnically similar to those in Hissar and Sialk who are labelled as 'Aryan' by Kappers and Vollois. This will no doubt raise many issues some of which are answered in Chap. XIV.

I Transliteration and meaning of important inscriptions

Abbreviations Used

AV	Atharva Veda	Pāṇ	Pāṇini
RV	Rig Veda	Dhātup	Dhatupāṭha
Ch. UP	Chāndogya Upanishad	Hitt	Hittite
TS	Taittirīya Saṁhitā	HP	Harappan
SB	Śathapatha Brāhmaṇa	IE	Indo-European
Panc. V. Br.	Panca Vimśa Brāhmaṇa		
Ait. Br.	Aitareya Brāhmaṇa		
Vāj. S.	Vājasaneyī Saṁhitā		

Fig. 33 Stage I

1. *g' p = ga-pa* — 'singer, protector'. 'Ga (the) protector'. Ga is the epithet of Bṛhaspati. *Ga* also means singer (RV), e.g., *sāmaga*. *Pa(pā)* 'to protect from' (RV).
2. *p' g = pa-ga* — 'protector, singer' or 'protector Ga'. In 1 and 2 vowelless consonants are used.
3. *p-ga = pag* — 'strong' (IE). The sign for *p* looks like the Semitic sign for *b* Hence use may read *bag* 'lord'.
4. *pag-da* — 'bestower of power'; $\surd$*dā* 'give' (RV).
5. *pa-ka = paka* — 'protector *Ka*(Prajāpati)' or 'guardian' e.g. *aja-paka*. In TS, Ka is expressly identified with Prajāpati (TS. 1. 7. *6*). If read *paka,* it means 'guardian' or 'protector'.

6. *pak*	'guardian'. If *pak=pag*, it means 'strong'. If equated to *pāka,* it means 'honest' (AV, TS).
7. *pp-ka = pa-ka*	same as 5 above.
8. *pa''-pa -pp-ra*	'protector' 'protector great'. If *pa-pprā* is read *pappra (pāpṛ)* it means 'protected'. Intensive of *pṛ* is *Pāpṛ*; *pra* 'great' (RV).
9. *pt = pat*	'governor'. *Pata* 'governed' (RV).
10. *pata' ppa-t (papat)*	'governed, governed' or 'governor (of) governor'. *Papat* is intensive of *pat.*
11. *pata'' śa-da*	'governed (or governor) eminent'; √ *śad* 'be eminent, powerful' (RV).
12. *sah(a)-pata*	'Victorious governor'. √ *sah* 'be victorious' (RV).
13. *ppat-ppa-ka =pat-paka*	'governor guardian'.
14. *ba-ka-pata*	'Baka governor (or governed)'. Baka is the name of a *ṛshi* (Kāṭh; Ch. up). If *baka=baga,* it means 'god'.
15. *pa'' - ba-ka*	'protector'' Baka'.
16. *ba-ka-pa*	'Baka (the) protector'.
17. *pah*	'protector'. *Pah* 'to protect, keep oath' in Hittite.
18. *ppah = pah*	-do-
19. *pt-da-sa = pat-dasa*	'governor Dasa'. Dasa is the name of a person or a demon (RV).
20. *phah-ra = pah-ra*	'bestower of protection' *Rā* 'bestow upon'. (RV).
21. *pa-ra = para*	'supreme'. *Para* 'beyond' (RV) in the sense of 'supreme'. If read *pa-ra,* it means 'bestower of protection'.
22. *va-ka*	Name of a *ṛshi.* Same as 'Baka'; see 14 above.
23. *pa'' śay-vā =pa''-śiva*	'protector 'Śiva (or auspicious)'. Śiva is also the name of a people; *śiva* 'friendly, auspicious, gracious' (RV). It may be read *śah* also.
24. *śāś-sāś = śāsa-śāsa*	'ruler (of) ruler' *Śās* 'to rule, command' (RV).
25. *a-p-a*	'water' √ *ap* 'work' (RV). *Apa* 'water, air' etc. (AV). *Apa* 'a water divinity'

STAGE II

S.No.	INSCRIPTION AND TRANSLITERATION	S.No.	INSCRIPTION AND TRANSLITERATION
46	= ra-da-t-ha	66	= śa-pau-ā
47	= g-ra-ā-ma	67	= śa-pak-ā
48	= g-rā-ā	68	= ma-ḥā-ś-ā-hā
49	= t-r-a	69	śa phag a
50	= tra-pprā	70	= pa‼śa-ā
51	= ppr	71	= śa-da
52	= phaga-pprā	72	= pa‼śa-da
53	= ḥā-rā-ā	73	= ma-hā-ś-da
54	= pa‼ḥā-rā-ā	74	= ś-dā-ae-ba-ka-ae
55	= ba-k‼ḥa-rā-ā	75	= pa‼ś-ś-ḥā-ś-da
56	= phaga-dra-h	76	= pa‼paha-śa-da
57	= pa‼dra	77	… = … śa-t-ā
58	= dra!pa-ā	78	= śa-ḫā-pa-ā
59	= ba-dra‼ma-ḫā	79	= pa‼śa-kka-ā
60	= ṛha-pa	80	= ś-h-ā
61	= pata-pa-ba-rhay	81	= śa-śa-mā-ḫā-hae
62	= śay-rā-r(a)-[hā	82	= pa‼ (contd)
63	= rā-ā		
64	= śaha-pprā		
65	= pa‼śa-ma-ḫā		

FIG. 34A

Note : For transliteration of transcription given above see page 199 ff.

26. *ba-h-a*	Baha='Baka'; see 14 above.
27. *t'' p-a-ka*	'Ta' 'guardian'. *Ta* may be an abbreviation of *tara* 'saviour'.
28. *ā-pt* = *āpta*	'friend'. If equated to *Aptya* it means' watery'; *āpta* 'obtained' (RV).
29. *p-ā* = *pā*	'protector' or 'protect' (RV).
30. *pak-p-ā*	'guardian, protector' or 'honest protector'. *Pāka* 'honest' (AV).
31. *pah-p-ā*	'protector (of) protector'.
32. *pak-bā-kka-ā* = *pak baka*	'guardian (or honest) Baka'.
33. *phag-ā-ppat-ppa-v* = *phaga-pat-pav*	'Lord (or gracious), governor pure'. As *p* and *b* were exchangeable, *phaga=bhaga*, 'Lord, bountiful' (RV). *Pav* 'pure' (RV).
34. *na-n-ā*	'mother'. *Nanā* 'concept for mother' (RV).
35. *pa'' ś-ś-ā (śāsa)* or *śaśa*	'protector Sasa'. or 'protector ruler'. If śaśa is equated to Sasa it is the name of an Ātreya, an author of a hymn of the *Rigveda.*
36. *śaśa* = *śāsa* or *Sasa*	'ruler' or Sasa, name of an Ātreya.
37. *p-ka-ae-ba-ka-ā*	'to guardian Baka' or 'to protector from Baka'.
38. *ao-kka-ā*= *okā*	'from home' or 'heaven'. *Okas* 'abode, home, refuge' (RV).
39. *ao-ma*	'friend'. *oma* 'helper, friend' (RV).
40. *ma-ḥā*	'great'. If *maḥa=makha,* the reference is to a a person. *Makha* 'a mythical being' (RV).
41. *ma-nā*	'Name of a person'. It occurs in several passages of RV. Manu was written Mana.
42. *ma-ḫā*	'great' or Makha, name of a person. See 40 above.
43. *pa'' mā-ḫā*	'protector'' great'.
44. *pah''-mhahaha*	'of protector great'.
45. *ā-ra*	'praiseworthy' √Ār 'to praise' (RV).

FIG. 34 A STAGE II

46. *ṛa-da-t-ha*	'of the prosperous' √*Ṛdh* 'to increase, prosper, succeed' (RV).

S.No.	INSCRIPTION AND TRANSLITERATION	S.No.	INSCRIPTION AND TRANSLITERATION
	pak–śa–śa–mā–ḫā–t–ha	85	= pp‖śā–ā –ma–ḫā
83	=pa‖ś–ś–da		
84	=pa‖śā–śa–da	86	=pata‖śā–ah–a
		87	=śā–kka–ā

Fig. 34B

Note : For transliteration of transcription given above see page 203 ff.

47. *g-ra-āma = garā-ma* — 'from Gara great' or 'from singer great' Gara is the author of a Sāman and a friend of Indra (Panc. V. Br.). *Ma* is a suffix used in superlative.

48. *g-rā-ā = garā* — 'from Gara' or 'from singer'. √*gṛ* 'sing, recite' (RV).

49. *t-ṛ-ā = tra* — 'save/saviour'; √ *trai* 'save' (RV).

50. *tṛ-ppṛā* — 'saviour great'. *Ppṛā* can also be read *pāpṛ*, an intensive of *pṛ* 'protect' (RV).

51. *ppṛ = pṛ* — 'protect/protector' (RV).

52. *phaga-ppṛā* — 'bounteous great', or 'Lord protector'. If *phaga=bhaga*, it conveys the sense of 'Lord, gracious, bountiful' (RV). If *ppṛā* is read *pāpṛ*, it means 'protector'.

53. *ḥā-ṛā-ā = harā* — 'Hara' or 'from the gratified' or 'from the destroyer'; √*har* 'to destory' (AV); *har* 'be gratified' (Hittite).

54. *pa" ḥā-rā* or *pa" hā-ṛka* — 'protector Hara (gratified)'. If *rā* which looks like *ṛk* is read *rka=arka* it means 'sun' (RV), and *ha* may be taken to mean 'trustworthy' (Hittite)

55. *ba-k"-ḥā-rā* or *bak" ha-ṛka* — 'Lord" destoyer' or 'benevolent gratified'. If *rā=ṛka* it refers to *Arka;* see 54 above for its interpretation. *Baka=baga* is an attribute here. *Rā* looks *ṛ+k=ṛk*. As *k* and *g* were exchangeable *baka* may be equated to *baga*.

56. *phaga-dra-h*	'Lord Dṛh', or 'gracious, strong'. √*Dṛnh* to 'be strong' (RV). *Dṛh* (Druhyu) is the name of a people in RV.
57. *pa''-dṛa*	'protector respected' or 'protector strong' √*dṛ* 'to respect, honour' (Dhātup). See also 56 above.
58. *dṛa' pa-ā*	'strong protector' or 'honoured protector'.
59. *ba-dra'' ma-hā* =*bhadra maha*	'auspicious'' great'. *Bhadra* 'auspicious' (RV). The unaspirate *b* was often used for the aspirate *bh.*
60. *ṛha-pa* = *arha-pa*	'able protector'.
61. *pata-pa-ba-rhay* =*pata-pa-barhi*	'governor, protector Barhi'. Barhi is the name of a descendant of Angirasa.
62. *śay(?)-rā-ṛa-ha* =*śarārha*	'śara (the) able'. Śara is the name of a son of a Ṛcatka (RV). *Śarārha* also means' one who is able in using arrows'. Here the first sign *śay* is used for *śa*. The auxiliary sign may stand for *a*.
63. *rā-ā* or *ṛk-ā*	'from bestower', or from *Arka.*
64. *śaha-pprā*=*saha-ppra*	'mighty great'; √*sah* 'conquer, be victorious' (RV). *saha* 'powerful, mighty' (RV). Ś and *s* were often exchangeable in HP and Hittite. Compare *śaha*=*saha; sāś, śāś*=*śās.*
65. *pa'' śa-ma-hā*	'protector'', mighty great'. Here *śa* is an abbreviation of *śah*=*sah.* See 64 above.
66. *śa-pav̊-ā* =*śa-pavā*	'from mighty, pure'. *Pava* 'purification' (RV). For interpretation of *śa* see 65 above.
67. *śa-pak-ā*=*śa-pakā*	'from mighty guardian' or 'from mighty honest'. *Pāka* 'honest' (AV).
68. *ma-ḥā-ś-ā-hā*=*maḥā-śāhā*	'from great mighty'. If *maḥā*=*makha* and *śāḥa*=*śākā* the inscription means 'vigorous helper'. *Makha* 'cheerful, vigorous, active' (RV). *Śāka* 'power, might, help, aid' (RV).
69. *śa-phaga-ā*=*śa-phagā*	'from mighty, bounteous (or Lord)' See 52 above.
70. *pa-śa-ā*=*pa''-śā*	'from protector, mighty'.

STAGE III

S.No.	Inscription and Transliteration	S.No.	Inscription and Transliteration
88	= eka–śā–rā–ā	104	= tṛ–ppat–rā(ṛk)–ā–hae
89	= sa–ka(kḫ?)⊥ eka–ś–da	105	= śa–śā–k–tṛ–da
90	= eka–phg–ā	106	= pah–ka–tṛ–da
91	= dyau–dra–gha‼	107	= pak–ḫā–śa–ka(kḫ?)–tṛ–da
92	= pp–dyau–ā–ṛ–hā	108	= śā–k–tṛ–ma–ḫā–hae
93	= pata‼ dyau–ś–śa–rā–ā	109	= śa–k–tṛ–da–hā
94	= pa‼dyau–ś–da	110	= pa‼śa–k–tṛ–ma–ḫā
95	= pa–rā–dyau–n–n–ā	111	= tṛ–ppat–rā/ṛk–ā
96	= kaśappa‼ ppa–dyau–ā	112	= pa‼catus–ha
97	= tṛ–a	113	= pata‼catus–ka
98	= pa‼tṛ–ka	114	= catus–śa–da
99	= pata‼tṛ–ka	115	= panc–h
100	= ga–ra‼tṛ–kā	116	= panc–p–ā
101	= pa‼tṛ–ś–kka–ppra	117	= pa‼panc–ka
102	= tṛ–pp–kka–ā	118	= ppāt–panc–ka
103	= śa–śa‼śa–tṛ–p–dyau–ha	119	= pha–dra‼tṛ–ka *OR* pha–dra–panc–ka

Fig. 35A

Note : For transliteration of transcription given above see page 203 ff.

71. *śa-da=śada* — 'eminent'.

72. *pa-śa-da=pa" śada* — 'protector, eminent'.

73. *ma-ḥā-ś-da =mahā-śada* — 'great, eminent' or 'benevolent, eminent'.

74. *śa-da-ae-ba-ka-ae=śadae-bakae* — 'to eminent to Baka'. Here the dative suffix is added to both the adjective and noun.

75. *pa-ś-ś-ḥā-ś-da=pa"-śaśahā-śada =pa" śāsaka-śada* — 'from protector" ruler eminent' or 'from protector Sasa, eminent'. Sasa is the name of an Ātreya (RV).

76. *pa" paha-śa-da* — 'protector" protector, eminent'.

77. *śa-t-ā=śatā=śata* — 'hundred'.

78. *śa-ha-pa-ā=śahā-pa=śaka-pā* — 'powerful protector' or 'mighty protector'.

79. *pa"-śa-kka-ā=pa"-śakkā* — 'from protector" powerful'.

80. *ś-h-ā=śha=śaha* — 'mighty'.

81. *śa-śa-mā-hā-hae=śaśa-māhāhae =śāsa-mahāhae* — 'of ruler great' or 'of Sasa (the) great'.

82. *pa-pak-śa-śa-mā-hā-t-hā=pa" pak-śaśa-māhāt-ha* or *pa" pava-śasa-mahatha* — 'protector" guardian ruler great (or important)' or 'protector," guardian Sasa (the) great'; *Pava* 'pure' (RV). *Mahat* 'important, great, eminent' (RV).

FIG. 34B

83. *pa"-ś-ś-da =pa" śāsada* — 'protector" commander'. *Śāsa* 'command, order' (RV). If *śśada=śada* it means 'eminent'.

84. *pa" śā-śa-da =pa" śāsada* — 'protector" commander'.

85. *pp"-śā-ā-ma-hā=pa" śā-mahā* — protector' 'mighty, great'.

86. *pata"-śā-ah-a=pata" śāha* — 'governor" mighty'.

87. *śā-kka-ā=śākkā=śāka* — 'friend' or 'helper'.

FIG. 35A STAGE III

88. *aeka-śā-rā-ā=eka-śarā* — 'supreme (or unique) Śara'. Śara is the name of a son of Ṛcatka (RV).

89. *śa-ka-eka-śa-da= śaka-eka-śada* — 'powerful supreme eminent'.

90. *aeka-phag-ā=eka-phagā*	'supreme Lord' or 'unique bounteous'. *Phaga =bhaga* 'Lord, bounteous' etc. (RV).
91. *dva-dra-gha=dyu-dragha (dṛha)*	'divine Drh'. Dṛhyu is the name of a people in the RV.
92. *pp-dva-a-ṛ-hā=ppa-dyu-ārha*	'protector, divine, able'.
93. *pata-dva-ś-śa-rā-ā=pata" dyu-ś-śarā* (or *sa-śara*)	'governor" divine Śara'. If *śśa-rā* is read *śa (sah)*-Śara, the inscription means 'mighty Śara'. See 88 above.
94. *pa"-dva-ś-da=pa" dyu-śada*	'protector" divine, eminent'.
95. *pa-ra-dva-nn-ā=parā-dyu-nanā*	'supreme, divine mother'.
96. *Kaśappa" ppa-dyu-ā*	'Kaśyapa" from protector, divine'.
97. *tṛ-a=tra*	'saviour'.
98. *pa"-tṛ-ka=pa" tṛka=pa" traka*	'protector" saviour'. If *tṛka* is read *trika,* it means 'consisting of 3' i.e. the 'Triad'.
99. *pata" tṛ-ka=pata" traka*	'governor" saviour' or 'governor" Triad'.
100. *ga-ar" -tṛ-ka=gara" traka*	'Gara" saviour', or 'Gara" Triad'.
101. *pa "-tṛ-ś-kka-ppra=pa" tṛ śakka-ppra*	'protector" saviour, powerful, great'.
102. *tṛ-pp-kka-ā=tṛ-pp-kkā=tra-pakā*	'from saviour, guardian'. If read *tṛpa-ka,* it means 'pleased Ka (Prajāpati)'.
103. *śa-śa-"śa-tṛ-p-dva-ha= śaśa" ś-tṛ-p-dyu-ha =śās" śtṛp-dyuh*	'of ruler" protector (from) the enemy (and) divine'.
104. *tṛ-ppta-ṛka-ā-hae= tṛpta-arka* (or *ṛā*)*-hae*	'of pleased Arka (Sun) or Fire', or 'of saviour, governor Arka'.
105. *śa-śā-k-tṛ-da=śaśāka-tṛda =śāsaka-trada*	'commander (or ruler) saviour'.
106. *pah-ka-tṛ-da*	'Protector Ka (Prajāpati), saviour'.
107. *pak-ḥā-śa-kha-tṛ-da* or *paka-ka-śaka-trada*	'guardian Ka (Prajāpati), powerful, saviour' or 'guardian of *Ś*aka saviour'.
108. *śā-k-tṛ-ma-hā-hā=śak-tṛ-mahāha*	'of powerful-saviour great'.
109. *ś-k-tṛ-da-ha=śak-tṛdahā =śaka-tṛadaha*	'of powerful saviour'.
110. *pa"-śa-k-tṛ-ma-hā=pa" śak-tṛ-mahā =pa"-śaka-tra-maha*	'protector" powerful saviour, great'.

111. *tṛ-ppta-ṛk-ā* =*tṛpta-arka* (or *ṛā*) — 'from pleased Arka' or 'from pleased bestower'.

112. *pa-kātṛ-ha=pa'' catur-ha=(catus-ha)* — 'protector'' (of the) four'.

113. *pata-catus (kātṛ)-ka* — 'governor (of the people or territory consisting) of Four'.

114. *catus (kātṛ)-śa-da* — '(the) four eminent'.

115. *pant-h=pancaha* — 'of the five'. Thes refer to be to the *Pancajanāh.* RV, among whom Dṛh and Pṛ (Pur) are mentioned in seals.

116. *pant-p-ā=pancapā* — 'protecor''(of) five'.

117. *pa-pant-ka=pa'' pancaka* — 'protector'' (consisting) of five'.

118. *ppata-pant-ka=ppat (ppata)-pancaka* — 'governor (consisting) of five'.

119. *pha-dra'' trka* or *pah-dra-pancaka (pant-ka)* — 'auspicious'' saviour'. If the two strokes above are counted with the three below the number will be five, and the inscription may read *Phadra (=bhadra) pantaka* '(the) anspicious five'.

Fig. 35B-Stage III

120. *pa''-shash-ka=pa''-shaska* — 'protector'' (consisting) of six'. If *shashka* =*śāśaka=śāsaka* it means 'commander'.

121. *ma-ḥḥa'' shash-śa-da* or *makha śāsa-śada* or *makha-sasa-śada* — 'makha'' Six eminent' or 'bounteous Sasa (the eminent'. Sasa is the name of an Ātreya.

122. *sapt-h=saptah* — 'of the Seven'. If read *saptāha,* it means 'a sacrifice lasting seven days'. (RV).

123. *p''-sapt-sāś-ā=pa'' sapta-sāś (śāsa)* — 'protector'' ruler (of the) seven'.

124. *pa''-(sapt)ā=pa'' sapta* — 'protector'' seven'.

125. *śa-sapta-sāś (śāsa)-ra-da-dvaha* or *rada-dyuha* — 'mighty ruler (of the) seven, prosperous (and) divine'. $\sqrt{}$*ṛdh* 'prosper, succeed' (RV).

126. *pa''-ma-hā-pa-sapt-saā-hae* =*pa'' -mahā-pa-sapta-sāha* — 'protector'' to great protector (of the) seven mighty'.

127. *phag-asht-ka* — 'bounteous of the eight'. Ashṭaka is the name of one of the sons of Viśvāmitra (Ait. Br.).

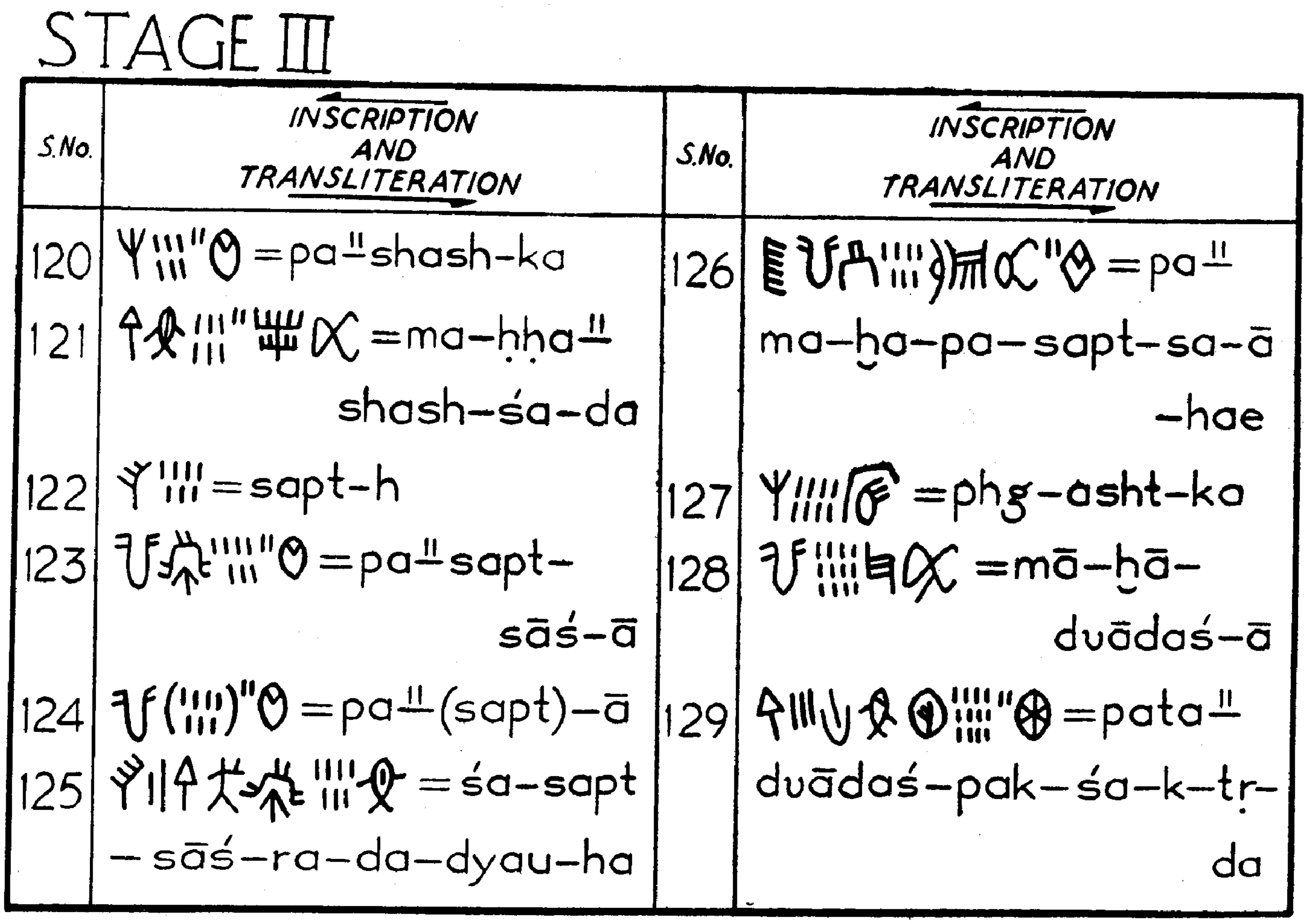


FIG. 35B

Note : For transliteration of transcription given above see page 205 ff.

128. *mā-hā-dvādaśa-ā* *=maha-divadasa* (?)	'great divadasa' (?) or 'great twelve'
129. *pata" dvādaśa-śa-k-tṛ-da (trada)=pata-divadasa śāka-trada*	'governor" divadasa (or twelve), protector, powerful, saviour'.

FIG. 36 STAGE IV

130. *aśvā-sa-tṛ=aśva-sa-tra*	'horse sacrifice' or 'a sacrifice performed by Aśva'. Aśva is the name of a teacher with the patronymic Sāmudri (S. Br).
131. *pata-aśvah=pata" aśvahā (aśvaka)*	'governor" Aśvaka'.

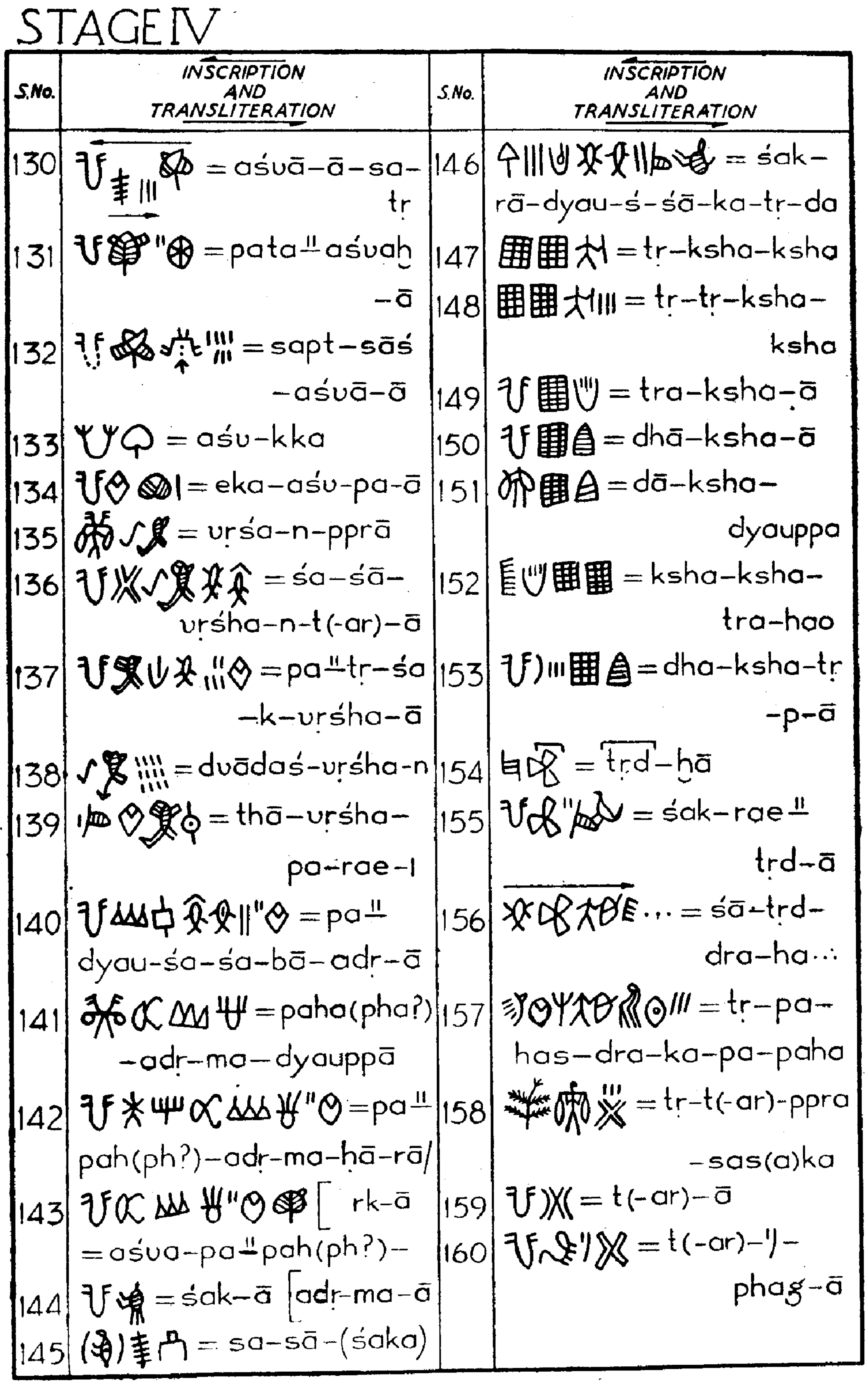


Fig. 36

Note : For transliteration of transcription given above see page 206 ff.

132. *sapta-sāś-aśvā-ā*

'from Aśva (the) ruler (of the) Seven'.

133. *aśv-kka=aśvakka*

'Aśvaka'.

134. *aeka-aśv-pa-ā=eka-aśvapā*

'Supreme (or singular) Aśvapa', or 'unique protector (owner) of the horse'.

135. *Vṛśa-n-ppṛā=vṛśan-ppṛā =vṛshan-pṛā*

'vigorous great'. *Vṛshan* 'powerful, mighty, vigorous, manly, great' as applied to animate and inanimate objects (RV,AV etc); any male animal as bull or stallion (also name of gods as implying strength especially of Indra and Maruts RV, AV. etc.).

136. *śa-śā-vṛsha-n-t (tar)-ā =śaśa-vṛshan-tara-śāsa-vsṛhan(tara)*

'from ruler Vṛshan saviour'. Here the 'cross-road' sign read for *t* was probably an abbreviation of *tar* meaning 'cross or save'; It was also a determinative for god, 'the saviour'. If *śaśa* is read Sasa it is the name of an Ātreya (RV.).

137. *pa''-tṛ-śa-k-Vṛsha-ā=pa'' tṛ-śak-vṛshā=pa''-tra-śaka-vṛsha*

'protector'' saviour, powerful vigorous'.

138. *dvādaśa-vṛsha-n =divadasa-Vṛshan*

'Divadasa vigorous (or powerful)' or 'the twelve vigorous'.

139. *thā-vṛsha-pa-ṛae =thā-vṛsha-parae-eka*(?)

'to protector vigorous supreme'; *tha* in the sense of 'protector' is used by lexicographers only.

140. *pa-dva-śa-śa-bā adṛ-ā= pa'' dyu-śaśa-bādrā =pa'' dyu-śāsa-bhadra* or *pa-dyu-Sasa-bhadra*

'protector'' divine ruler, auspicious' or 'protector divine Sasa (the) auspicious'.
It was common to elongate the vowel unnecessarily and to use the unaspirated form for the aspirate in HP and Hittite. eg. *bādra* for *bhadra, bākkā* for *baka.*

141. *pha-adṛ-ma-dyuppa =pahadṛma-dvippa* or *bhadra-ma-dvīpa= phadṛma dvīpa*

'greatest protector (of the) mountain land or (division) or 'most auspicious *(bhadrama)* land'; *dvīpa* 'island, sand bank' (RV). Here *ma* is used in the superlative sense. *Adṛ=adri* mountain; *dvippa=dvīpa* 'division'. If *pha* is a substitute for *bha* the epithet *bhadrama* means 'most auspicious'. *Dyu-ppa* means 'divine protector'.

142. *pa''-ph-adṛ-ma-ḥā-ā-rā-ā* or *pa'' phadra-maḥā-ṛkā =pa-bhadra-maha-arkā*	As *p* and *b* were exchangeable *phadra* may be read *bhadra*. 'from protector'' auspicious great Arka (the Sun or Fire)'.
143. *aśva-pa-ph-adra-ma-ā =aśvapa''-phadrama*	'from Aśvapa (the) most auspicious' or 'from the protector of horses'' most auspicious'. If *phadrama* is read *pah-adṛ-ma* it means 'greatest protector of mountain'. *Phadra=bhadra.*
144. *śak-ā=śakā=śaka*	'powerful'.
145. *sa-sā (śaka)=sasā-śaka*	'Sasa, Śaka'. Both appear to be names. Sasa is the name of an Ātreya.
146. *śak-ṛā-dva-śa-śā-ka-tṛ-da=śakrā-dyu-ś-śaka-tṛda=śakra-dyu śāsaka-trada*	'from the mighty divine, commander saviour'. *Śakra* 'mighty or powerful' (RV). Here *ś-śaka* may be equated to *śśaka* or *śāsaka*.
147. *tṛ-ksh-ksh=traksha*	Name of a man. Tṛkshi is the name of a man with the patronymic Trāsadasyava (RV). Tṛksha 'name of a person' (Pāṇ). The logosyllabic sign for *ksh* is written twice for stress.
148. *tṛ-tṛ-ksh-ksh=tṛ-tṛkshksh=tṛksh*	'Name of a person'. See 147 above. Doubling of signs for stress as in *tṛ-tṛ-ksh-ksh, ppaka* etc was common in HP. If the first sign *tṛ* is read as a separate word *tra*, the inscription means 'saviour Tṛksha'.
149. *tra-ksh-ā=tṛakshā=tṛksha*	Same as above.
150. *dha-ksha=daksha*	'able' or 'name of an Āditya' identified with Prajāpati (TS; S. Br.). *Daksha* 'able, clever, intelligent, dexterous' Here *dh* is used for *d.* See 151 below.
151. *dā-ksh-dvappā=daksha-dyuppa (dvippa)=dakshadvīpa*	name of an island or 'able, *(daksha)* divine, (*dyu*) protector (*pa)*'.
152. *ksh-ksh-tra-hao* or *Kshatrahha*	'of the dominion' 'or of the government' *Kshatra* 'dominion, supremacy, power (whether human or supernatural especially as applied to Varuṇa-Mitra and Indra) 'governing body, government' (RV AV; TS) etc.

153. *dha-ksh-tṛ-p-ā=dhaksha-tṛ-pā* — 'able, saviour protector' or 'able, pleased'.

154. *tṛda-ha (tridaha)* — 'of the Triad' or 'of the destroyer'. *Tṛd* 'destroy, cleave, pierce' (RV).

155. *śakrae-tṛd-ā=śakrae" tṛda* — 'to the powerful" Triad (or destroyer)'

156. *śā-tṛd-draha* — 'mighty Triad (or destroyer) strong'. *śa=śah* 'victorious', mighty

157. *tṛ-pp-has-dṛa-ka-pa-paha= tṛ-pahas-draka-pa-paha* — 'of saviour, protector, strong, defender'. *Pahhas* 'protect'.

158. *tṛt-ppra-sasaka =trita-ppra- śāsaka* — 'Trita great commander'. Trita is the name of a Vedic deity (RV). The word in RV for grass is *sasa*. If the last sign for plant is read as *sasa* it stands for the name of an Ātreya, author of RV. If however it is read *sasaka* because of the addition of the sign for *ka* to the motif, it can be equated to *śāsaka* 'commander'. The sibilants were interchangeable.

159. *t(ar)ā=tara* — 'Saviour' as applied to Rudra. If the 'cross road' sign is taken as a determinative for 'god' (saviour), Ā may be the name of a god.

160. *t'-phag-ā=t(-ar)' phaga* — 'saviour (or god) bountiful'. The sign for *p* is like semitic *b*. Hence we may read *bhaga* 'Lord, gracious, bountiful'.

In a brief article such as this it is not possible to discuss the philological and grammatical features of the Harappan language at some length. The declension of nouns and adjectives, formation of present participles of verbs, addition of suffixes to nominal stems for forming agent and action nouns and formation of intensives of verbs and nominal compounds are discussed in a separate monograph. Peculiar features of the Harappan language such as the unnecessary doubling of consonantal signs, unnecessary elongation of vowels, formation of aspirates by adding a laryngeal sign to stops and, more than all, the evolution of the Indus script from a syllabic system to an alphabetic system of writing (fig. 36C) and revival of trade contacts in the Late Harappan period (fig. 37) will be discussed in the forthcoming book *The Indus Civilization and Writing*. In the meanwhile I may record here that Professors Ignace J. Gelb and W.W.de Grummond, Late Prof. David Diringer, Prof. Mrs. Kammanhuber, Dr. B. Ch. Chhabbra and Late Shri P. B. Desai have endorsed my decipherment of the Script as convincing.

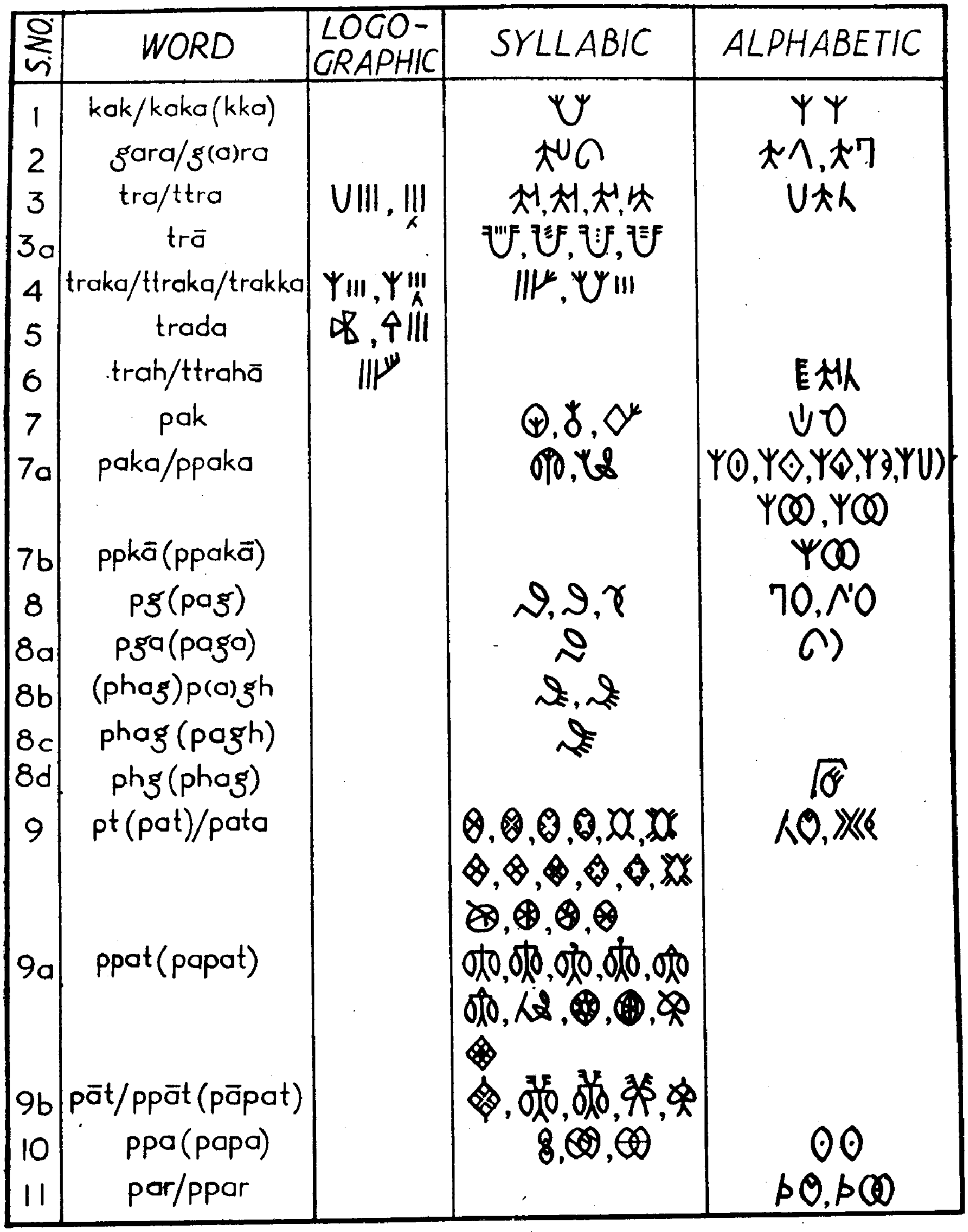


FIG. 36A

Indus words: different systems of writing

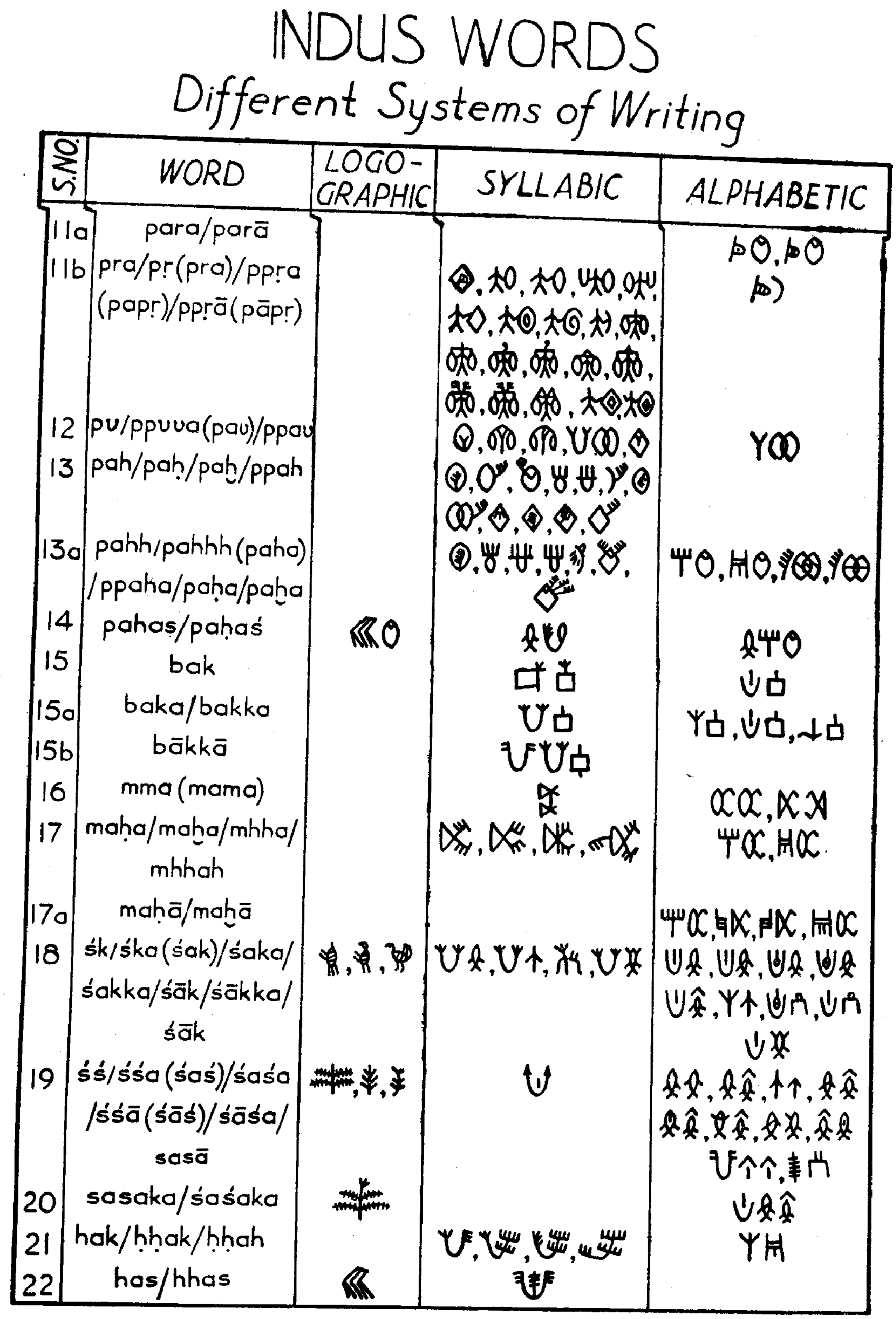

INDUS WORDS
Different Systems of Writing
S.NO.
WORD
LOGO-GRAPHIC
SYLLABIC
ALPHABETIC
11a para/parā
11b pra/pṛ(pra)/ppṛa (papṛ)/ppṛā(pāpṛ)
12 pu/ppuva(pau)/ppau
13 pah/paḥ/paḫ/ppah
13a pahh/pahhh(paha) /ppaha/paḥa/paḫa
14 pahaṣ/paḥaś
15 bak
15a baka/bakka
15b bākkā
16 mma (mama)
17 maḥa/maḫa/mhha/ mhhah
17a maḥā/maḫā
18 śk/śka(śak)/śaka/ śakka/śāk/śākka/ śāk
19 śś/śśa(śaś)/śaśa /śśā(śāś)/śāśa/ sasā
20 sasaka/śaśaka
21 hak/ḥhak/ḥhah
22 has/hhas

FIG. 36B

ORIGIN OF EARLY ALPHABETS

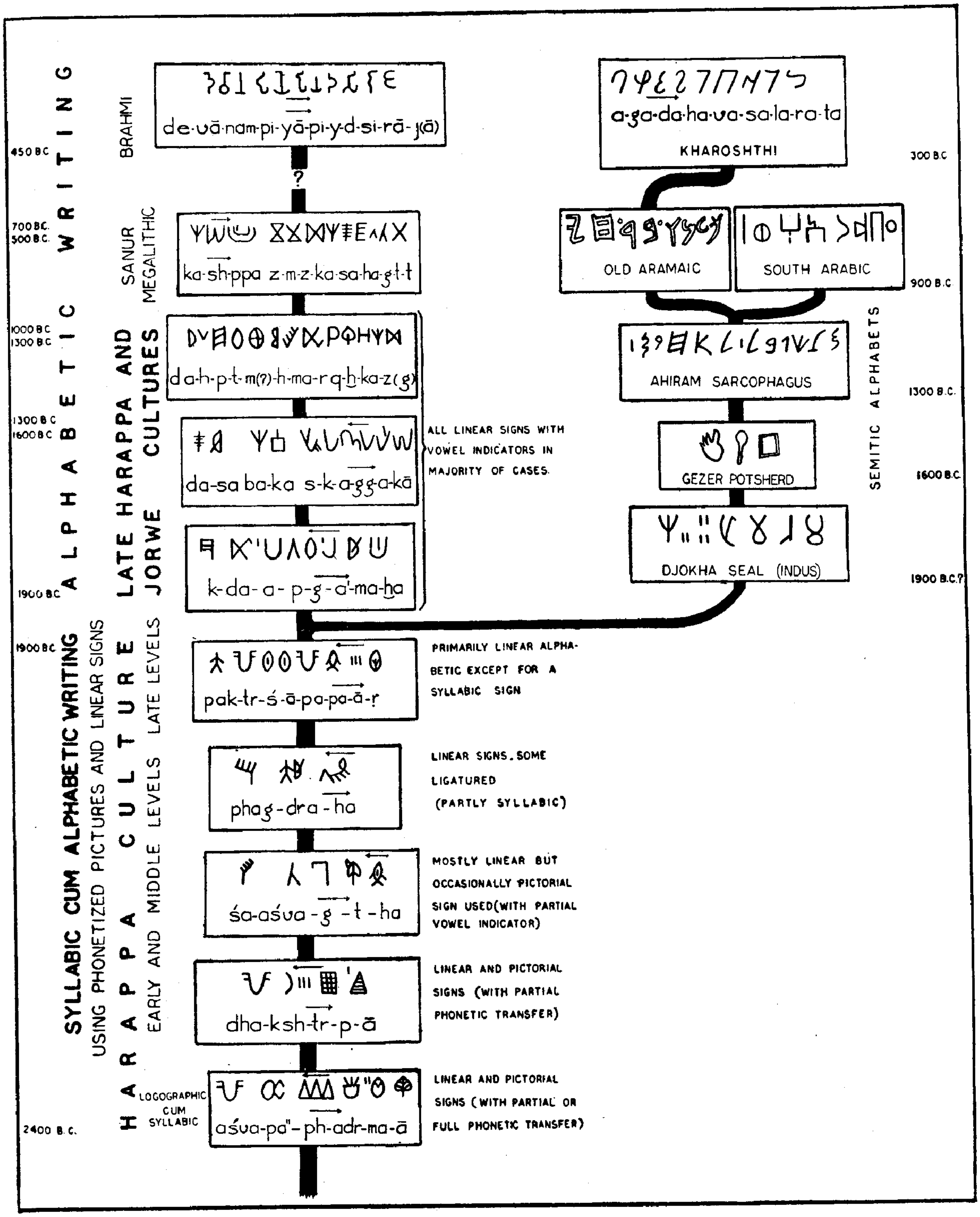


FIG. 36C

CHAPTER X

THE HARAPPAN RELIGIONS

1. INTRODUCTION

The Indus Civilization has been regarded by many scholars, rightly or wrongly, as non-Aryan. In support of this theory they argue that the Harappans worshipped the Mother Goddess, phallus and the tree represented by female terracotta figures, conical stone objects and pipal leaf motifs respectively. The figure of the horned three-faced *yogī* surrounded by animals is said to represent the non-Aryan god Siva as lord of animals. Negative evidence adduced in favour of the same theory is the lack of knowledge, on the part of the Indus people, of rice and horse which formed an essential part of sacrifices offered by the Aryans. It may however be noted that no structure which can be identified as a temple or public place of worship has come to notice in the citadels of Harappa, Mohenjo-daro and Kalibangan or in the Acropolis of Lothal, but a fire-altar is noticed in a public place in the Lower Town at Lothal.

A study of the skeletal remains from the Harappan cemeteries has revealed that the population was a mixed one representing more than one ethnic group (above p. 146), while the recent excavations at Lothal and Kalibangan have brought to light hitherto unknown aspects of the Harappan religion. A reassessment of the cult-value of certain Indus objects in the light of the new evidences from Harappan sites outside the Indus valley is therefore necessary.

2. CULTS

A. The Mother Goddess

The cult of the Mother Goddess was popular in the Indus valley where a large number of almost nude female terracotta figures wearing garlands, girdles and headgears are found. As a fertility cult its origin is traced to Anatolia. Surprisingly enough the typical Indus Mother Goddess figure is conspicuous by its absence in Gujarat and Rajasthan. None has been found at Rupar, Alamgirpur, Rojdi and Desalpur. Out of five female figures from Lothal two are nude (pls. CXCVI-CXCVII), but none wears the ornaments seen on the Indus valley figures. Another figure with pedestal base has a cup-like projection of pinched clay around the head, but no legs are shown, and the arms are just suggested. The Lothal figure may be said to show greater affinity with the female figures from Kulli than with those from Mohenjo-daro. The Mother Goddess is not represented on any Indus seal. Perhaps the worship of the goddess was a household cult popular with a section of the population in the Indus valley, but not outside. This itself is an indication that the population was not homogenous and no single faith was uniformly followed, much less rigorously

enforced by the king or the priest, but the word *Nanā* used in the *Rigveda* for 'concept of mother' may be a reference to Mother Goddess.

B. Śiva-worship

A male god, horned and three-faced, sitting in the position of a *yogī* and surrounded by animals is depicted on more than one seal from the Indus valley. He is considered to be the prototype of Śiva as 'Lord of the Beasts and Prince of the *yogis*'. Regarding this deity Wheeler[1] says 'Here, if anywhere, may be recognized one of the pre-Aryan elements which were to survive the Aryan invasions and to play a dominant role in the so-called Aryan culture of the post-Vedic period'. The seated Śiva of the Indus seals or any other divinity in human form is conspicuous by its absence on the seals from Lothal.

C. Phallus-worship

The conical objects of stone and terracotta found at Harappa and Mohenjo-daro are said to be cult-objects. Based on the assumption that Harappans are phallus-worshippers they are identified with the *Śiśhṇa-devas* mentioned in the *Ṛigveda.* Among several objects from Mohenjo-daro identified as phalluses at least two[2] are similar to the stone mullers found at Lothal. One of the *yonis* from the same site appears to be an anchor-stone[3]. A couple of smaller terracotta and stone objects look like phallus, but their cult value is doubted. It is not unlikely that the larger conical objects from the Indus valley were used as weights, while the smaller ones served as gamesmen as in Mesopotamia and Egypt.

Anyway it is not safe to attribute cult-value to an object on the basis of its shape or just because no other satisfactory explanation is available in the present state of our knowledge. As an instance it may be mentioned that the terracotta triangular 'cakes' which were once considered to be cult objects are found to have been used in flooring and for decorating the walls of the houses.

D. Worship of the Tree, bull and Serpent

Among the vegetable motifs depicted on the seals from Harappa and Mohenjo-daro the pipal tree occupies an important place. It is frequently painted on the earthenwares and the pipal leaf occurs as a symbol in the inscriptions on seals. As a sacred plant it is venerated by the Hindus even now because of its therapeutic value. The Aryans too worshipped the *aśvattha* (pipal) tree and used its dried twigs for making the sacred fire in fire-worship *(agnihotra)*, indicating thereby that the veneration of pipal tree was not primarily non-Aryan.

[1] Wheeler *op.cit.* (1960), p. 89.
[2] Mackay *op.cit. II* (1938), pl. CIV 28.
[3] *Ibid.* pl. CIV, 27.

The worship of the bull (the vehicle of Śiva) is said to have been indicated by the occurrence of bull and bull-like (unicorn) animals on the seals. It may be noted that Indus seals were used mostly for a commercial purpose and not for their magical value. This does not however preclude engraving animals considered sacred by the individual owners on the seals to serve as 'trade marks'. If this is accepted, the total absence of the long-horned bull on the Lothal seals suggests that this species was not very much venerated in Gujarat. It is the short-horned humpless variety which is represented here. Anthropomorphism does not appear to have prevailed much, although animism did, with a section of the society. Strangely enough, bull is not shown on those seals on which the three faced horned deity in yogic pose is depicted. Two potsherds, on each of which a pair of snakes is painted in black over red, are found at Lothal. One of them depicts a snake entering an ant-hill and the other emerging from it (pl. CLXXIIA, 4). On the second sherd are painted two hissing snakes below a tree (pl. CLXXIIA, 5). On a third sherd two snakes are drawn in a stylised form (pl. CLXXIIA, 6). According to local tradition two snakes, named Dholakuvar and Bholakuvar lived in Lothal mound and the town was destroyed partially when one of them left the ant-hill. The destruction is said to have been complete when the second serpent also deserted the place, but much credence need not be given to the story. Snake worship is no doubt an ancient cult from the Vedic times. According to *Taittirīya Samhita*[1] and *Atharvaveda*[2] offerings were made to serpents for four months from *Śravaṇa* to *Mārgasīrsha*. According to Susruta, lungs are cleared of harmful germs by inhaling the air where snakes move. It was not exclusively a non-Aryan cult. The Aryans also made offerings to serpents as indicated in the *Atharvaveda, Āpasthambha Grihya Sūtra* etc.

E. Fire-worship

Lothal has brought to light new religious rites observed by the Harappans in Kathiawar. Some of the houses in Block 'A' of the Lower Town had rectangular and circular pits cut into the floor and lined with mud-plaster, while in others rectangular enclosures were built on mud-brick altars. These shallow pits and enclosures are found to contain ash, burnt earth and, occasionally, a few potsherds. The absence of any opening for supply of fuel and their unusual size and shape suggest that they could not have served as ovens. All the mud-brick altars excepting one, noticed in private houses are rectangular on plan and measure, on an average, 1 ft. 6 in. × 1 ft., while the circular pit is 1ft. 6 in. in diameter (fig. 14; pls. XLI B and LIII A). Two altars noticed in Street 1 and Street 9, and both assignable to phase IIIA, are enclosed by burnt-brick walls built on a raised platform of mud bricks. The altar in Street 9 (pl. XCIV A) measures 9 ft. × 8 ft. 6 in., the depth being 1 ft. (fig. 14). The altar in Street 1 (pl. XCV A) is 8·5 × 8·75ft. on plan and 3 ft. ft. deep. In the former case a posthole and two rectangular and semicircular depre-

[1] P.V. Kane, *op.cit* II (1941) pt. II, p. 823.

[2] *Atharvaveda* VIII, 7.23 and XI.9.16 and 24.

ssions meant for keeping vessels are noticeable. A large earthen jar of 'S'-profile beautifully painted in the Indus style with peacocks, plant motifs etc., was found placed close to the altar (pl. CLXVI A). Perhaps it was meant for keeping offerings.

The mud-brick altars are 6 to 8 in. deep and the walls are of two or three courses of bricks, whereas the burnt-brick altar in Street 1 has twelve courses. The floors and walls of altars are usually mud-plastered. The burnt-brick altars contained terracotta spheroid and ovoid balls, triangular 'cakes' and burnt clay lumps besides ash and potsherds. A terracotta ladle found in close proximity to the altar in Street 9 and bearing smoke-marks (pl. CCXVII A) suggests that it was used for pouring a liquid into the fire. Obviously, the circular and rectangular altars must have been built for ritualistic worship of fire.

The earliest reference to fire-worship in India is contained in the Vedic texts which mention three fires, namely, *Gārhapatya, Āhavanīya* and *Dakshiṇātya*. The *Rigveda* mentions the *Gārhapatya* fire[1] and the three *savanas* (pressing of Soma in the morning, mid-day and evening)[2].

The earliest evidence of domestic fire-worship at Lothal comes from a house (Str. 12) assignable to phase IIa. In phase III however a fire-altar of burnt bricks was built in a public place. One such altar (96) built in Street 9 and described previously must have been used for communal fire-worship. Whether this particular structure was used merely for offering milk to fire as in the *agnihotra* or for performing a sacrifice as in the *Darśapurṇamāsa* is not very clear. In the absence of any animal remains or other objects normally associated with animal sacrifices it must be presumed that the altar was meant for comummal fire-worship.

Two fire-altars with rectangular walls of mud bricks assignable to phase IV were found along with two sturdy water-pots in SRG 2, C 17-18 (175). The hall of altars in the said house (pl.X) may represent the *Agniśāla* referred to in the *Atharvaveda*.[4] Another enclosure, this time a circular one, built in the vicinity of the same house (pl. LIII A) was also used for ritualistic purpose.

The total absence of fire-places in the Acropolis in phases I to III suggests that were found of the Acropolis did not observe fire-worship. It is only after the Acropolis ceased to be the seat of power that a mud-brick altar for fire-worship came to be built in a rickety house (163) of a craftsman in phase IV. An inference that may be drawn from these facts is that no state religion involving fire-worship or animal sacrifice existed in phases II and III. Had political authority been based on religious sanctions, the ruler should have built impressive temples for fire-worship or animal sacrifices in the Acropolis, especially when the common man in the Lower Town had altars built for such purposes. In phase IV, however, communal fire-worship appears to have come into

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[1] *Rigveda* I. 15.12; III 28.1

[2] Kane, *op.cit*, II (1941), p. 981

[3] *Ibid.* p. 1033 ff.

[4] *Atharvaveda* ix, 3, 7.

vogue in the Lower Town side by side domestic fire-worship. At Kalibangan too, a row of fire-altars with central stumps has been found recently. In this connection mention may be made of an oval enclosure with a central stump in a house (pl. LXXXVI B) in Block E at Lothal which resembles the fire-altars at Kalibangan. Fire-altars must have existed at Harappa and Mohenjo-daro also, but they have been missed by the excavators owing to mass digging. One fire-altar was found at Amri and another at Rangpur in IIC. It is too early to say whether the platform on which the fire-altars are built at Kalibangan was itself a religious structure.

F. Animal Sacrifice

An extremely important structure (97) laid bare in a house assignable to phase III is a small rectangular mud-brick enclosure measuring 2 ft. 9 in. × 2 ft. 6 in. built in SRG 2, B 19 over a low platform (fig.15, pl.CCCI). Only two courses of mud bricks are visible in the wall and the present depth of the enclosure is about 8 inches. It contained charred fragments of the jaw bones of an animal of the bovine group, a circular disk-shaped gold pendant, a carnelian bead, six sherds of a thick storage jar painted in chocolate over buff and a large quantity of ash. The enclosure was not disturbed much except for the fact that on two sides mud bricks had disintegrated, but clear traces of the original extent of the platform and enclosure were available. The charring of bones was not due to any accidental fire, nor were the bead, bangle, pottery and ash brought in here by flood. It is therefore reasonable to conclude that the mud platform must have been used as a sacrificial altar and the mud-brick enclosure as a sacrificial pit.

Offering of bovids in sacrifices is referred to in the *Brāhmaṇas*. Often five animals, namely, a man, a horse, a bull, a ram and a he-goat were offered in certain Vedic sacrifices. The *Kāṭhaka*[1] however, allows an option to use clay heads of the above-mentioned animals instead of killing them. In *Gavām-ayana,* a bull was also offered[2]. Kane mentions that after the *anubandhyā*[3], *pāśu-puroḍāsā* messes of boiled rice were offered to *Anumati*, *Rāka* etc., and a cake on twelve potsherds to *Dhātṛ*. In other types of sacrifices gold objects and ornaments such as beads and bangles were also offered. Thus all the objects found in the sacrificial pit at Lothal can be satisfactorily accounted for in terms of Vedic sacrifices. The *Vedi* and *Agnicyayana* were constructed near the house but unfortunately we do not know the full plan of the house to decide whether the altar was built in the verandah or outside. In Kalibangan too a sacrificial pit (*kuṇḍa*) was found.

3. FUNERARY PRACTICES

The funerary practice of a particular community helps in ascertaining its religious beliefs. From this point of view Lothal is very important. Apart from the single burials

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[1] Kane, (1941), *op.cit.*. Vol. II p. 1247.
[2] *Ibid.*, p. 1241 ff.
[3] *Ibid.*, p. 1201·

commonly noticed in the Harappan cemeteries Lothal people followed a new practice involving the simultaneous burial of two bodies. Three examples of joint burials noticed in the Lothal cemetery are described earlier (above p.140ff). Out of six skeletons from these burials Chatterjee and Kumar have identified two skeletons as belonging to females; but Sarkar says that there were no females (above p. 144). On the authority of Chatterjee and Kumar one may infer that self-immolation by the wife after the husband's death was in vogue in phase III and both were buried together. Sankalia thinks that the joint burials of Lothal suggest the ceremonial burial of the wife or servant or, better say, dependent, after the husband or the master rather than a form of *Satī*. The reasons for suggesting that one of the funerary practices of Lothal folk included a form of *Satī* have been stated earlier (above p.143).

Another important point made out by Sarkar (above p.144) is that all the skeletons excepting one belong to the age-group 20-30. As there is no trace of any other cemetery at Lothal than the one situated to the northwest of the town, it is probable that those aged more than 30 were disposed of other than by inhumation. Perhaps they were cremated or exposed to elements. Both the practices were known in the Vedic period. The observance of post-cremation burials at Harappa, stratum V of AB mound is very significant, since it may point to cremation being practised by a section of the population at Harappa as in Sutkagendor and Damb Buthi (above p. 140).

4. KNOWLEDGE OF RICE AND HORSE

It is argued sometimes that the Harappans were non-Aryans as they had no knowledge of the horse and did not use rice, both of which played a dominant part in the daily life of the Aryans. This argument is not tenable any more because horse bones have been found in the late levels of Harappa[1] and Mohenjo-daro[2], and now in the mature Harappan levels at Lothal[3] and Surkotada. Terracotta figurines of horse occur at Rangpur[4] as well as Lothal. The earliest occurrence of rice in India is at Rangpur and Lothal in the mature Harappan levels. Obviously, horse and rice must have been known to the Harappans as early as 2200 B.C.

5. CONCLUSION

The occurrence of the name *Manā* or *Manah* on a terracotta seal from Lothal may be noted. According to the *Rigveda* (X. 63) Manu was the institutor of sacrifice, for, when he kindled the fire, he presented the first offering with the seven priests to the gods (RV.

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[1] B. Nath, 'Animals of Prehistoric India and their affinities with those of the western Asiatic countries,' Records of the Indian Museum Vol. 59, pt. 4. p. 358.

[2] Wheeler (1960) p. 65.

[3] S. R. Rao (1973) *op.cit.*

[4] S. R. Rao (1963a) *op. cit* p. 139.

VII. 2). *Agnishṭhoma* was in vogue prior to the Rigvedic age. The seven devotees on a seal from Mohenjo-daro (Mackay: pl. XXXVI, 430) seem to represent the priests, while the god emerging from *aśvattha* bough may be Agni. Widely divergent religious practices involving high philosophical and ethical ideas and crude animism are seen in Harappan society. For example, if worship of the Mother Goddess and Siva existed side by side with the cult of tree worship in the Indus valley, fire-worship and animal-sacrifice were practised outside the valley.

An important contribution made by the Harappans to world civilization is the science of mental discipline 'yoga'. Several terracotta figures in yogic *āsanas* have been found at Harappa (Vats: pl. LXXVI, 1-10) and Mohenjo-daro and the three-faced god on Indus seals is also seated on a stool in yogic pose. Even the gods of the Indus people are depicted in contemplation moods. This evidence should convince any serious student of *yoga* about the origin *of yoga* in the Indus valley.

CHAPTER XI

TRADE AND TRANSPORT

1. MERCHANDISE

A highly industrialized society like the Harappan depended to a large extent on trade, both inland and overseas, for the supply of raw-materials and export of manufactured goods. Among the manufacturing industries of Lothal bead-making, ivory-and shell-working and bronze-smithy were very important. The bronze-smiths needed copper and tin for making tools and ornaments and the lapidaries required semiprecious stones such as agate, onyx, crystal etc. The seal-engravers and blade-makers also depended on imported steatite and chert, while goldsmiths eagerly awaited the arrival of the precious metal which was in great demand everywhere. The best known source of agate and onyx is the Ratanpura mine near Rajpipla in the Narmada valley, where Harappan and Late Harappan ports such as Bhagatrav and Mehgam are situated. They exported the raw material to Lothal for processing into beautiful beads. Etched and non-etched carnelian beads manufactured at Lothal and elsewhere were imported by Ur, Kish, Brak, Lagash and Asmar in the Euphratis-Tigris valley, and Giyan, Sailk and Susa in Persia. Ivory was, however, available at Lothal (Chap. XXII), but gold had to be imported. The high percentage of silver and the absence of copper and lead in the gold pendants found at Lothal suggest that the native alloy electrum which was made use of in making gold ornaments came from the gold mines of Hatti or Kolar in Mysore State. Raw steatite required in large quantities by the lapidaries and seal-engravers of Lothal appears to have come from the southern neolithic sites such as Tekkalakota, Utnur, Maski etc. In return for steatite, the Neolithic people got beads of baked steatite and carnelian and occasionally copper and bronze tools also. Chert was imported from Sukkur-Rohri in Sind or from the factory site near Salvadgi in Bijapur district of Karnataka, which seems to have supplied finished blades. Certain varieties of wood such as *santalus* appear to have been obtained from Malabar. Teak was grown in the hills of Gujarat.

Lothal had developed overseas trade with the west coast of India on the one hand and the Mesopotamian cities through the Bahrain islands on the other. The scarcity of metals in the alluvial plains of the Sabarmati necessitated import of copper, tin etc., from outside. Lothal received its supply of copper from a source other than the one which supplied to the Indus cities (Chap. XIX). It must have come from the copper mines of Oman in south Arabia or from the Persian highlands through Susa and Bahrain.

It is presumed that the Rajasthan mines supplied copper to Indus and Sumerian cities. The latter also received *sis wood* and trinkets which included beads of gemstones and inlays of shell and ivory. Cotton cloth was another important commodity exported to Sumerian cities. In this connection the necessary evidence is provided by an imprint of an Indus seal from a bale of cloth from Umma near Lagash. As an important

centre for shell-fishing and ivory-working Lothal must have exported inlays and gamesmen of shell and ivory to Sumerian cities. In return it received copper amulets, gold beads with axial tube and painted earthenwares. Although woollen garments are mentioned in Sumerian clay tablets, there is no evidence of its import left in Indus cities.

The evidence for trade with Sumerian cities is provided by seals, beads and other objects found in the Euphrates-Tigris valley. In the Akkadian house at Asmar an Indus seal and kidney-shaped inlays of bone[1] were found. Gold disk-beads with axial tube similar to those from Lothal 'A' are reported from the Early Dynastic III levels at Ur[2] and in Troy II[3]. The significance of Indus type seals at Brak, Ur, Kish, Lagash, Umma, Nippur Tepe Yahya and Susa, cylinder seal at Mohenjo-daro and circular seals of Persian Gulf origin at Lothal which provide reliable evidence of a two-way traffic of goods is discussed elsewhere (p. 228 ff.). Among other mechanisms of Indus trade found in Sumerian cities mention may be made of cubical chert weights at Ur, Brak and Kish. More recently, Sumerologists have been able to throw fresh light on the Dilmun trade referred to in the Sumerian clay tablets. From the available data it is clear that as early as 2450 B.C. the Dilmun ships brought timber to Lagash in the reign of Ur-Nanshe, while by 2350 B.C. Sargon could boast of ships from such distant lands as Dilmun, Magan and Meluhha visiting the new capital, Agade. The Tepe Yahya evidence of an Indus seal confirms contact between Iran and India in 2300 B.C.. As per the clay tablets of Ur dated 1950 B.C. the sailors returning from Dilumn offered a share of their cargo which included gold, silver, copper, stone beads, ivory combs and inlays, eye-paint, and pearls to the Goddess. It is interesting to note that while in the time of Sargon of Agade a substantial part of the trade with Magan and Meluhha was direct using Dilmun as a feulling station, by 2100 B.C., under the Third Dynasty of Ur, brisk trade was carried on directly with Dilmun and Magan but not with Meluhha, though copper, stone beads and ivory objects were supplied by the last mentioned region. Still later, under the Dynasty of Larsa, Ur had direct connections with Dilumn only. From an analysis of the data it is inferred by certain scholars that Dilumn, Magan and Meluhha lay at successively greater distances. Prof. Bibby identifies Bahrain islands with Dilumn. On the other hand, Prof. S.N. Kramer is of the opinion that as the Indus valley lies to the east of Sumer and is known for its clean cities, the honour should go to the Indus valley. Be that as it may, it is certain that Indus valley and Kathiawar together supplied beads of gemstones, ivory and shell, and cotton goods, and perhaps copper, if Khetri mines were worked in those days.

2. ORGANIZATION OF TRADE

If Indus trade was organized on the same lines as the Sumerian we may refer to the clay tablets of Ur which throw much valuable light on the nature of contracts

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[1] *Oriental Institute of Chicago Communications*, No. 16 (1933), pp. 48 ff.

[2] D.E. McCown : *The Comparative stratigraphy of Early Iran* (Chicago 1942) p. 53 and Table I.

[3] Carl W Blegen, *Troy and the Trojans* (London 1963) p. 74

and the amount of risk shared by the merchant-financiers, sailors and captains. Details about the nature of merchandise and the amount of tax paid are also available. As trade- and craft-guilds became common in the latter half of the first millennium B.C. in India it is reasonable to suppose that similar guilds existed in earlier times also. We have definite evidence at Lothal to show that large workshops employing several craftsmen under the same roof were established. Some kind of partnership in trade is also suggested by the impressions of multiple seals on the sealings.

Lothal, with its large market and a busy dock, was a great emporium where goods from neighbouring towns and villages such as Rangpur, Koth etc., were sold in exchange for imported and locally manufactured ones. The overseas trade necessitated provision of berthing and warehouse facilities. The Lothal seamen and engineers may be said to have led the rest of the world in designing and constructing an artificial brick structure to sluice ships at high tide. The fact that they ensured floatation of ships at low water by introducting a water-locking system in the dock speaks volumes about their skill in marine engineering. Furthermore a 800-ft. long wharf and a massive warehouse were built to ensure safe haulage of cargo, quick inspection of goods and prompt collection of customs duties. The prosperity of the merchant class and craftsmen who dominated the town depended on the proper maintenance of the dock and warehouse. Soon after the partial destruction of the dock at the end of phase II the engineers repaired the walls and restored them to original height and grandeur. Again in phase IV they had to dig a mile-long canal to revive the dock which had gone dry owing to the sudden change in the course of the river. All this presupposes the existence of a powerful merchant class specializing in international trade. They must have established workshops and provided finance to the master-craftsmen and captains of ships. We have seen how large bead factories and smithies were established in the Lower Town at Lothal. From a merchant's house comes interesting evidence of foreign trade which consists of Reserved Slip Ware and nine gold pendants with axial tube, both traceable to Sumerian cities. In addition, the house yielded two Indus seals, several chert blades and carnelian beads. In another merchant's house also pottery of foreign origin was found. Unfortunately we do not know how the merchant class had organized itself and on what terms they provided finance to the craftsmen and captains. But it is evident from the name and titles of 'rulers' on the teracotta sealings found in the warehouse that he was considered the protector. The goods were sealed here and perhaps taxes were collected in kind. To enable him to exercise effective control his residence was built in close proximity to the warehouse overlooking the dock. The prosperity of Lothal ended with the total destruction of the dock and the decline of the merchant class.

We have already seen that Lothal imported precious stones and metals from far and near. The Harappan ships do not seem to have gone south of Bhagatrav, for, the author's systematic exploration of the west coast of India has yielded only negative evidence. It is the southern Neolithic traders who brought gold, steatite etc. upto Daimabad.

According to *Bāveru Jātaka*, *Suppāraka* (*Supparaka*, modern Sopara) is said to have been an important port from where several ships left for *Bāveru*, which is identified by some

scholars with Babylon and by others with Bahrain. As Rangpur is known to have obtained *Santalus* and other varieties of wood, it is reasonable to suppose that the ships from Malabar called at Lothal. They might have halted at Udyavara,[1] a port south of Goa. Recently black-and-red ware assignable to 300 B.C. has been found here. The discovery of a large brick wharf in Rājbandar at Elephanta near Bombay confirms that berthing facilities existed along the west coast in the first century A.D. and perhaps earliar also.

The Indus merchants reached as far as the Persian Gulf and the Euphratis-Tigris valley (p. 228 ff.). Terracotta models of gorilla and 'mummy' and a variety of African wood found at Lothal suggest trade with East Africa and Egypt. Unless the Lothal modellers had intimate knowledge of the gorilla it would not have been possible for them to show accurately and in great detail all the characteristic features of this animal. Similarly the models of the mummy from Lothal and Mohenjo-daro suggest a close study of the Egyptain funerary practices. Further it is not unlikely that the inverted firing technique of Lothal was borrowed from Egypt where it was known earlier. Another evidence of contact is provided by the name *Sikotarīmātā* associated with the sea-goddess and ancient ports of Gujarat. She derives her name from Socotaro, an East African island. Lastly, some of the gamesmen from Lothal simulate those from the tomb of queen Hatchepsout, while the etched and plain carnelian beads found in Egypt and Bahrain in the third millennium B.C. levels are products of the bead factory of Lothal.

The Indus merchants appear to have established colonies at Ur, Kish, Brak, Lagash, Susa, Nippur and further north in the Diyala region. They got Indus motifs and script engraved on locally made seals. Pottery painted with Indus cult scenes found in the Diyala valley may be taken as another evidence of Harappan contact. From the occurrence of seals with Indus motifs at Ras-al-Qala and Failaka we may infer that Indus merchants had established their colonies in the Persian Gulf islands also.

Sea-borne trade over long distances would not have been possible had there been long harbourless stretches of coastline. Balakot on Makran and Navinal in Kutch are important ports between Lothal and Sutkajendor. Ports on Kathiawar coast have been mentioned (above p. 34) earlier. Furher exploration may bring to light more Harappan ports to light.

3. MECHANISMS OF LONG DISTANCE TRADE

A. Weights

Extensive trade necessitated standardization of weights at Lothal. Two types of scale-weights in stone have been noticed here. The first type consists of cubical weights of agate and chert which are in the Indus system. The second group consists of spheroid weights of schist and chert with flat top and base. A few barrel-shaped weights found at Lothal must have been imported from the West Asian centres of trade, and the cubical weights of the

[1] S.R. Rao *Presidential Address to the Conference on Keladi Dynasty* (Shimoga, 1969).

Indus type occurring at Susa, Kish and Brak must have gone from the Indus valley. While the cubical weights are in the ratio of 1,2,4,6,8,16,32,64 and 120, the spheriod ones bear the ratio 1,7/2,7,14 and 28 (Chap XX). Thus two standards were in vogue at Lothal, one agreeing with the Indus standard and the other with the Heavy Assyrian Shekel. Several small conical objects of schist with a button top and groove at the neck are found at Lothal, but they do not bear any referrable ratio to one another.

B. Seals and Sealings

Lothal has made an important contribution to our knowledge by furnishing convincing evidence about the use of Indus seals. They were used for sealing packages of goods or documents. Most of the terracotta sealings from Lothal bear on the reverse impressions of packing material such as woven cloth, reeds and cords, and thereby throw light on the process of sealing. After fastening the wet clay-label to the package one or more seals were affixed. Besides the king or his agent some other authority must have also affixed seals on the clay tablets. Usually the designation or title of the ruler namely 'protector' *(pa)*, saviour *(tra)* or Chief (*Maha*) is mentioned on the seals. Sometimes the name of the ruler also occurs on it. Occasionally the title e.g. 'ruler of the Seven' *(Pa-Sapta-ā)* or 'ruler of the Five' *(Pa-panta)* also appears on the seals.

4. TRANSPORT

Land transport consisted of bullock carts and pack animals, the latter being used in marshy places and hills. Three types of bullock carts can be made out from the terracotta models found in the excavation. One of them resembles the light-wheeled type of cart and the other the solid-wheeled type used nowadays in Saurashtra. For long-distance trade over land routes pack-animals alone were useful, but on inland waterways, flat-bottomed boats of the type suggested by the terracotta models found at Lothal must have been plying. In this connection it may be noted that even today flat-bottomed boats made of reeds simulating the Egyptian boats plying in the Nile are used in the Nal lake for fishing and transport of men and light goods. Perhaps similar boats were used in the lakes and rivers by the Harappans also. Trade on the high seas and along the coast was possible because of ships fitted with sail. Two types of boats with sails can be made out from the terracotta models. (Chap. XVIII). Two specimens of the first type have a sharp keel and pointed prow besides holes for the mast, but only one of them is complete (pl.CCXXIIIB). The multi-oared boats painted on the potsherds from Lothal are reminiscent of the Egyptian galleys. The ship engraved on a seel from Mohenjo-daro has a cabin. From the meagre details available from the terracotta models, engravings and paintings it is not possible to determine the size of the actual ships in use. However the very fact that the Lothal dock had an inlet, 41 ft. wide in the early stage and

23 ft. wide in the later stage, suggests that the Harappan ships must have been as big as the modern country crafts which bring timber from Malabar to Gogha. On this analogy it can be assumed that the larger Harappan ships were able to take a load upto 60 tons. The size of the anchor stones found in the Lothal dock also supports this view.

CHPATER XII

SOCIAL ASPECTS

The population of Lothal which was cosmopolitan in character consisted of the long-headed proto-Austrloids, the broad-headed Alpines and the slightly long-headed Mediterraneans, all of whom lived together peacefully. In the absence of the skeletal remains assignable to phase I it is difficult to say as to who the indigenous people of the peninsula represented by the Micaceous Red Ware Culure were. But, whoever they may be, the Harappan penetration into Kathiawar was peaceful and both contributed to the prosperity of Lothal. Over the centuries, indigenous population lost its identity.

In a cosmopolitan town like Lothal uniformity in religious practices cannot be expected. While one section of the population offered oblations to the Fire God and sacrifice danimals to please the gods, another might have believed in animism and worshipped the tree and snake. It is difficult to say whether these widely different religious rites were observed by ethnically different communities. On the other hand, it is interesting to find both dolichocephals and brachycephals practising joint burials (p.144).

The ruler of the town, as stated earlier, was not a priest-king. Had he been one, he should have got a religious structure built in the Acropolis itself, which he did not do. Even the altars meant for animal-sacrifice and fire-worship are confined to the Lower Town in phases I-III. Perhaps the ruler derived his authority not from any religious sanction, but from the willing co-operation of the common people. His wealth and qualities of leadership must have helped the ruler to exercise effective control over the inhabitants. If the present reading of the seals is any indication of the status of the ruler, he was a 'friend, protector and saviour' *(oma, pa, tra)*. He provided civic amentities in the Acropolis as well as the Lower Town and enforced regulations strictly. It is true that the Acropolis had greater civic amentities by way of numerous drains and a separate well for potable water, but the Lower Town did not lack essential amenities such as roads, drains and soakage jars. The impressive look of the ruler's residence built on the highest platform with extra safety measures is said to indicate the military power of the ruler and the existence of a military class, but this is not true at least so far as Lothal is concerned, for the higher platforms and larger buildings were only visible expressions of the ruler's wealth and political authority. In reality the platforms were an anti-flood bolster which was provided to a lesser degree in the Lower Town also. As the ruler needed a commanding view of the dock and the warehouse for supervising the transactions, his mansion stood on a higher platform. The peripheral wall which enclosed the Lower Town also did not serve the purpose of a defensive wall against human enemies. The existence of a military class at Lothal will have to be ruled out because the weapons used are so few and insipid that no war can be waged with the help of such flimsy weapons. This is true of larger Indus cities also. The thin blades of the spearheads buckle up when used against a

hard surface, while the small copper arrowheads are just fit for killing birds and small animals. On the whole it can be said that there was nothing like a military or non-military class. There does not appear to have been much of a disparity in the social status of various communities following different occupations, for, the wealthy merchants and the ordinary craftsmen lived together in Block A of the Lower Town. The houses of the commoners had certain minimum amenities such as paved bath and drain, soakage jar and a spacious kitchen besides one or two living rooms. The merchant, no doubt, had a more spacious house in the same locality. There is no basis for assuming that all the public works were built by slave labour at the behest of the ruler. In fact no one lived in conditions in which a slave was expected to live in the late third millennium B.C. With the willing co-operation of the inhabitants public works such as the dock, peripheral walls and drains were built and maintained. The construction of common plinths for scores of houses is another evidence of cooperative endeavour.

The prosperity of Lothal declined as a sequel to the catastrophic flood at the end of phase III and, with it, the political authority exercised by the ruler also waned. The merchant-prince was not to be seen in phase IV when the Acropolis came to be occupied by artisans such as dyers, bone-workers etc.

Religion had greater hold on the artisans and merchants during the later days of Lothal, when in the Acropolis also a fire-altar came to be built after the artisans occupied it.

A brief mention of the important occupations of the people may be made here to gain an idea of the social status and economic conditions of the various communities. Agriculture, stock-raising and fishing were the main occupations of a large section of the Lothal population. They produced the surplus food needed for sustaining the industrial workers and traders. While cotton-growing and chank-fishing helped the development of overseas trade, the bronze-smiths met the requirements of the craftsmen in tools, and the shipwrights built ships for carrying on trade. The bead-makers and ivory-workers supplied luxury goods for export. The cotton-weavers produced cotton goods which were in great demand at home and abroad. The most important occupation from the point of view of accumulation of wealth appears to be trade, as indicated by seals, silver bangles and gold jewellery found in the spacious houses of merchants.

The administrative machinery of the town was well geared to the needs of a prosperous society. The municipal regulations regarding the layout of the houses and maintenance of sanitary conditions were strictly enforced in phases II and III, but the frequent floods wrought so much havoc with private and public buildings and dealt such a heavy blow to the economic prosperity of the town that the political structure gradually cracked and broke down. The ruler and the ruled were equally tired of natural calamities. The ruler could not therefore exercise effective control over the inhabitants and ultimately disappeared from the scene.

The poorer material equipment and the low standards of construction noticed in phases IV and V are clear indications of the decadence of the Harappans at Lothal which is reflected in the material equipment of many other Late Harappan and post-Harappan sites in Gujarat[1].

[1]S. R. Rao (1973) p. 60 ff.

CHAPTER XIII

LOTHAL AND MESOPOTAMIA

1. Evidence of trade Contacts

The identification of the trapezoid brick structure at Lothal as a dock and the discovery of Harappan ports such as Sutka-gendor, Balakot and Sotka-koh on the Makran coast and Navinal, Prabhas, Mehgam and Bhagatrav in Gujarat have given a coastal bias to the Indus Civilization. The pottery, seals and trinkets of Sumerian origin found at Harappa, Mohenjo-daro, Chanhu-daro and Lothal and the Indus seals, beads and weights found in the Sumerian sites point to a flourishing sea-borne trade between the Indus and Sumerian cities in the third and second millennia B.C. (pl. CCCII). The recent discovery of a Persian Gulf seal at Lothal and the occurrence of several circular seals bearing Indus motifs and script in Bahrain and Failaka suggest that the Persian Gulf islands took an active part in Indo-Sumerian trade. In the light of the new evidence a review of the commercial and cultural contacts between the two civilizations is found necessary.

A. Seals and Sealings

Among the important Indus objects found in datable levels in the Euphratis-Tigris valley and the non-Harappan objects of foreign origin occurring in the Indus valley and Lothal (Table XII) seals and sealings afford definite evidences of trade between India and and Mesopotamia in the third and second millennia B.C.

Gadd[1] has listed as many as eighteen seals of the so-called Indus type found at Ur. Some of them, especially numbers 8 to 13 of his list, belong to the class of 'Persian Gulf seals' which have now become familiar to us as a result of the excavations in Bahrain by Prof. Glob and Dr. Bibby. Among the rest, seal nos. 2, 3, 5, 16 and 17 may be said to be of Indian style on account of the motifs and script, some of them having a prominent perforated button on the back as in the case of the Indus seals. Others have a large but low boss engraved with three or four parallel lines in one direction and are perforated along another. Four double circlets, two on either side of the parallel grooves, are also noticed (pl. CCXCII A). The 'Persian Gulf seal' from Lothal[2] is comparable to the circular steatite seal no. 8 of Gadd's list. Both are engraved with gazelle-like animals. Thus Gadd's list of seals can be rearranged into (a) Persian Gulf seals (8 to 13) and (b) Indian style seals (2, 3, 5, 16 and 17). In this connection it is necessary to mention that square seals were exclusively used by the Harappans, cylinder seals by the Sumerians and

[1] C. J. Gadd in *Proceedings of the British Academy. VIII* (1932).
[2] S. R. Rao. 'A Persian Gulf Seal from Lothal' *Antiquity.* (1963).

their successors, and circular ones by the merchants of the Persian Gulf. The occurrence of curcular seals bearing the Indus script and motif in the Persian Gulf and cylinder seals bearing similar motif and script in the Euphratis-Tigris valley suggests that the Indian merchants who had established their colonies in Mesopotamia and Bahrain used a local type engraved with Indus motif or legend or both. These motifs and legends engraved on the circular seals found at Ur are attributable to Indian merchants who had their colonies in the Persian Gulf and traded with the merchants of Ur. Similarly Sumerian merchants, who had their colonies in Bahrain, must have adopted the Sumerian devices on circular seals.

The clay labels i.e., sealings bearing impressions of circular seals with geometric designs found at the Harappan sites including Lothal suggest that it is the foreign merchants exporting goods to India who used the circular seals. The only Persian Gulf seal found at Lothal must have come in the course of trade with Bahrain or Failaka. Alternately it may belong to a Bahrain merchant living at Lothal.

It must be admitted that seals of foreign workmanship are rarely found in the Indus valley. A lozenge-shaped seal from Harappa bears the motif of a splayed eagle. A bronze eagle with spread wings from Brak dated *circa* 2100 B.C[1]. may be compared with this motif. A terracotta sealing no. 1292 (pl.CLXIIA, 1) bears two impressions of a square stamp seal with a design resembling the *swastika* of multiple lines exactly as in the terracotta seal no. 19 from Tell Brak. Another seal from the same site has a normal *swastika* motif as on Indus seals[2]. Circular stamp seals with similar motifs occur in Ur[3] and Alisar[4]. A square stamp seal of the same class is also reported from Sialk[5]. Another motif noticed on the stamp seals from Lothal and Indus cities is the compartmented square. A seal in shell and a sealing in terracotta (pl. CLXIIA, 2) are two more examples of this type from Lothal comparable with a seal from Giyan[6]. Furthermore, the writer found in the collection of the Department of Western Asiatic Antiquities in the British Museum, London, a seal (no. 118431) with linear signs resembling more or less those on a rectangular terracotta seal from Lothal (pl. CLIXC, 1). The latter does not appear to be native either to the Indus valley or Kathiawar. Other West Asian sites where seals with *Swastika* motif are found are Alisar[7] and Sialk[8].

B. Stone Weights

Among other important mechanisms of long distance trade found at the Harappan and Mesopotamian sites are stone weights of different shapes and standard. A remarkable

[1] M.E.L. Mallowan in *Iraq,* IX (1947), p. 171; pl. XXXII, 5.
[2] *Ibid.* pl. XX, *31* and *33.*
[3] British Museum, Department of Western Asiatic Antiquities, seal no. 128668 (Unpublished).
[4] E. F. Schimidt *Alisar Huyuk* (1931), pl. XXXVII, Abb. 186.
[5] Ghirshman, *Fouilles de Sialk* I; pl. LXXXVII, S. 17.
[6] Conteneau, *Fouilles de Giyan,* Fig. 38, *13.*
[7] Schmidt *op.cit.* (1931) pl. XXXVII, Abb. 186.
[8] Ghirshman, *op.cit.* (1939) I, pl. LXXXVII, 8.17.

feature of the Indus trade is the use of hexahedron weights of chert and agate as distinct from the duck-shaped and barrel-shaped weights of alabaster used in Mesopotamia and Egypt. The Harappans used occasionally truncated spheriod weights made of black schist and chert also. Hence, the presence of cubical and truncated spheriod weights of the Indus type in West Asian sites should be deemed as another sure evidence of the extension of Harappan trade into the Euphratis-Tigris valley. A cubical weight of agate weighing 11.43 gr. has been found in strata IX-X at Tepe Gawra,[1] where a conical one also occurs in Stratum VIII. The cemetery at Kish has yielded cubical weights of chert[4] weighing 1 oz., 5 grs., and 51 grs. and each of them has some markings.[2] These weights are assigned to 2500-2100 B.C. A cubical weight of banded agate is reported from Susa D also.[3] Conical weights with or without blind holes were not common in the Indus valley and the few found at Lothal and Mohenjo-daro and closely resembling those from Tepe Gawra, must have come from Mesopotamia. They are considered as gaming pieces by Tobler.[4]

C. Copper Objects

One of the most important commodities which Lothal imported was arsenic-free copper. Some scholars are of the opinion that the Khetri mines in Rajasthan supplied arsenic copper to the Harappans. Sankalia has suggested on the basis of the flat celts and sheet of copper and copper slag found at Ahar in Central India that the earliest settlers of the place must have worked the copper mines and quarries situated at Debari, Delwara and Kotri within a radius of 20 miles from Ahar[5]. It is however surprising that except for this hoard of copper sheet and celts there is no evidence of any large-scale use of copper by the Ahar folk, nor is there any proof of having smelted copper here as early as 2,000 B.C. Moreover the variation in the ratio of impurities of the Khetri and Debari copper as compared with that of Lothal precludes the possibility of Lothal folk having drawn their supply of copper in the form of ore or ingot from any indigenous source. The bun-shaped copper ingots of the type found at Harappa and Mohenjo-daro containing arsenic may be traced to other ancient copper-working sites in Central and Western India. Arsenic-free copper is found at Susa[6] (pl. CCXLVII B) and Enkomi (Cyprus)[7]. The Sumerian clay tablets mention frequently the import of copper ingots from Dilmum and other distant ports. How extensive was this trade in copper and bronze ingots can be visualised from the fact that a Bronze Age ship wrecked off Cape Galedonia on

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[1] Speiser, *Excavation at Tepe Gawra* (Philadelphia, 1935) pl. XCVII, 7-9.

[2] Mackay, (1962) pl. XLII, 2598. *Sumerian Palace and 'A' cemetery at Kish,* (Chicago, 1929), pl. XLII, 2598.

[3] In the Reserve Collection of the Louvre Museum.

[4] Tobler, *Excavations at Tepe Gawra II* (Philadelphia, 1950) pl. XCIVa.

[5] *Indian Archaeology* (1961-62) pp. 44-45.

[6] S.R. Rao 'A Persian Gult Seal from Lothal' in *Antiquity* XXXVII (1963), pl. XI (b).

[7] Schaeffer *op.cit.*

the southwest coast of Turkey and salvaged recently by the American Expedition (University of Pennsylvania)[1] is found to have carried bun-and ox-hide type ingots of copper and bronze. Some of the bun-shaped ingots found in Susa D are comparable in weight and size with those from Lothal (pl. CCXLVIIA), Mohenjo-daro[2] and Chanhu-daro.[3] However the absence of arsenic in the Lothal ingots suggests Oman as an alternate source of copper where the ore is said to be free from this impurity. The close identity in shape, weight and absence of arsenic, between the Lothal and Susan ingots is rather baffling. It is surmised that Cyprus or Oman supplied copper ingots to Lothal in view of the fact that bun-shaped ingots are found only in Bahrain, Cyprus and Susa outside the Indus valley and Gujarat.

In the course of trade many trinkets were exchanged between Lothal and Susa. Thus we find steatite disk-beads and gamesmen of Indus type in Susa, (pl. CXXVIA, 1-2) while a copper dog and a bull-amulet of Susan type are found at Lothal. The close similarity in the shapes of the copper objects such as barbed fish-hooks, tanged arrow-heads, splayed chisels, hollow nail and revet with flat head common to Susa and Lothal may be attributed to the exchange of ideas through trade. In this connection it may be noted that the clay tablets from Ur refer to the trade in copper ingots. The reference comes from the letters addressed to a travelling merchant by name Enasir[4] who imported copper from Telmum into Ur. More than 13,000 minas of copper according to the weight standard of Telmun and also ingots termed *guburum,* each weighing upto 4 talents, are said to have been imported. As is evident from the statement that the importer was free to select 'good' *guburum,* the metal does not appear to have been refined. The author of the tablet also complains that he was promised 'good' ingots but bad ones were shown to his messenger with the added insult of saying "take it or leave it".

The copper figurine of a bird with a rod-like projection at the bottom found in phase III of Lothal must have been a bird-headed pin of the type found at Alisar Huyuk in a Hittite context[5]. Bird-headed pins are found in Luristan in 1900-1600 B.C.. Paul Jacobsthal refers to bird-headed pins from Caucusus and Luristan[6]. The body of the animal continues to form the shank in the case of the Alishar and Lothal examples whereas in other cases the body is away from the shank. Bibby refers to a bird-on-rod found in the excavations at the Barbar village in Bahrain.[7] Some pins from Hissar IIIC have animal figures but not birds. Animal-headed pins are however found at Harappa also.[8] Amulets in the form of domestic and wild animals, fish and tortoise are found in considerable numbers at

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1 George F. Bass. 'A Bronze Age Shipwreck' in *Expedition* (Pennsylvania 1961), vol. 3, no. 2, p. 1 ff,

2 Mackay *Further Excavations at Mohenjo-daro II,* (London 1938) p. CXXXII *37-39*

3 Mackay, *Chanhu-daro Excavation* (New Haven 1943) p. 186.

4 A.L. Oppenheim 'The seafaring merchants of Ur' *Journal of the American Oriental Society,* vol. 74, pp. 6–17.

5 E.F. Schmidt, *op. cit.* (1931), p. 161 b.

6 Paul Jacobsthal, *Greek Pins and their connexions with Europe and Asia,* p. 263, fig. 10.

7 T.G. Bibby and P.V. Glob in *Scientific American* (October 1960), vol. 203, p. 65.

8 Sir Leonard Woolley *Ur Excavations,* IV (Philadelphia 1956) p, 28, *9486.*

Ur. Among them the amulets with figures of bull looking front or sideways[1] in black marble, alabaster, lapis lazuli, shell and agate are of particular interest. There is one amulet from Ubaid levels which bears resemblance to the bull amulet from Lothal. Tell Asmar has also yielded a silver bull amulet in an Akkadian building[2]. From Uruk level II come bull amulets of a different type. But considering the close resemblance between the bull amulets from Lothal and Susa (pl. CXXVIA, 9) it is presumed that Lothal got its specimen from Susa. Ur, as another source of supply, cannot be ruled out. In this connection attention may be drawn to the classification by Piggot of copper pins found in the Indus valley and Mesopotamian sites[3]. A curved copper knife of Harappan type is reported from Hissar IIIB which is said to overlap the Akkadian level.[4] Without multiplying the instances of common types of tools and ornaments it may be noted that copper objects were freely exchanged between Lothal and Sumerian cities.

D. Beads

Noteworthy among the industrial establishments of Lothal is a manufactory of stone beads. There is no doubt that Lothal exported beads of gemstones etc. to the Euphratis-Tigris valley in the 3rd and 2nd millennia, for, several cylindrical and barrel-shaped beads with a lenticular section characteristic of the Indus civilization have been found at Susa, Asmar, Kish and Ur. Among other types eye-beads of agate, etched carnelian beads, wafer disk-beads of steatite and segmented faience beads are common to Ur and Harappan sites. The clay tablets of Ur also mention gemstones and beads being imported into Ur from Dilmun, Makkan and Meluhha. According to Mackay the technique of etching is said to have travelled from India to West Asia. In this connection, it may be noted that Lothal which has yielded the largest number of etched and other varieties of stone beads may be credited with developing the technique of etching. Outside the Indus valley and Saurashtra etched carnelian beads are found in Susa D,[5] early graves of the pre-sargonid and sargonid periods at Ur,[6] Hissar IIIc,[7] Troy II, Cemetery A at Kish[8] and the Akkadian levels of Asmar.[9] Disk-beads of steatite are found at Kish, Ur, Brak, Gawra etc. They also occur in the sargonid levels of Brak. Of particular interest are the heart-shaped inlays of shell from Tell Asmar.[10] These instances are sufficient to show that Lothal and other Indus

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[1] In the reserve collection of the Louvre Museum, Paris.

[2] Henri Frankfort, *Tell Asmar, Khafaje aud Khorsabad,* (Chicago 1933) p. 43-52, fig. 31.

[3] Stuart Piggot 'Notes on certain pins and a Mace-head from Harappa in *Ancient India,* No. 4, pp. 25-41.

[4] D.E. McCown, *The Comparative Stratigraphy of Early Iran* (Or. Inst. Chicago, 1942), p. 53, Fig. 16.

[5] Reserve Collection in Louvre Museum, Paris.

[6] Sir Leonard Woolley, *The Royal cemetery, Ur Excavations,* II, p, 366; pls. 133 & 220

[7] E. F. Schmidt, *op. cit.* (1931), pp. 223; pl. XXXV.

[8] E. J. Mackay 'Further Links between Ancient Sind, Sumer and Elsewhere' *Antiquity V* (1931) pp. 459-61.

[9] Frankfort (1933), p. 51; fig. 33

[10] *Ibid.*

cities were the main source of supply of beads of gemstones and steatite to Mesopotamian sites.

E. Pottery

Pottery hardly travels long distances, but when it does, it is a sure indication of cultural or trade contact. Among the ceramic wares from Susa D[1] some convex-sided bowls, flat dishes and jars with flaring rim in a pink ware with smooth micaceous surface (pl. CXXVI B) are vaguely comparable to the Micaceous Red Ware vessels from Lothal A (pl.CLXXA). Further, the footed beakers and vases in a buff ware from Susa have their counterparts in Lothal A. The Louvre collection included perforated jars, 'S'-shaped vessels, beakers and vases in the buff ware from the Larsa period of Mari,[2] which simulate the Lothal types. It may also be noted that Kish cemetery 'A' has yielded goblets, footed beakers and storage jars characteristic of the Indus valley pottery. From Tepe Gawra come beakers and knobbed lids,[3] revealing Harappan affinity. The same site has also yielded steatite disk-beads and saw-edged chert blades.

The most important ceramic ware of foreign origin occurring in Lothal A and Mohenjo-daro is the Reserved Slip Ware (pl. CLXXXIV.) Its presence in the Sargonid level at Brak[4] (pl. CCXCIV) and Ur[5] confirms contact between the Indus sites and Ur in the Sargonid period. Elsewhere it occurs in Ninevah 4, i.e. in the last phase of Jamdet-Nasr period and Warka too. It may be noted that at Ur and Mohenjo-daro the light slip of the ware is removed from the darker body, while at Kish the dark slip is removed from the light body. At Lothal we have both the specimens. It is likely that the reserved slip technique originated in some centre other than Ur, Kish or Brak. In the Indus sites it is found in small quantities. Other ceramic wares of considerable significance are those vaguely resembling the Ubaid and Halaf Wares at Lothal. Particular mention must be made of the chocolate- or buff-painted ware from Lothal A (pl. CLXXXIVA) closely resembling a similar ware from Ubaid levels of Ras Sharma (pl. CXXVIIIA2-6). The occurrence of an imitation Halaf Ware at Lothal resembling the real one from Ras Sharma and Arpachiya (pl. CXXVIII) cannot be explained unless it is proved that the early levels of Lothal A go beyond 3000 B.C. Another possibility is that an imitation ware came into use long after the Halaf period in some West Asian centre wherefrom Lothal received a few vessels (Chap. XVII). The Reserved Slip Ware occurring in phases II and III of Lothal has thus helped in assigning the early levels to the sargonid period.

F. Miscellaneous Objects

Gaming pieces of various shapes in terracotta, shell and ivory have been found at Lothal. Some of them, especially cones and tetrahedrons with or without an ivory handle,

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[1] In the reserve collection of the Louvre Museum.

[2] In the reserve collection of the Louvre Museum, (Show case 3).

[3] Schaeffer, *op. cit.*, fig. 91.

[4] M. E. L. Mallowan *Iraq*, vol. IX (London 1947) pl. XLII 1-5.

[5] Woolley in *Antiquaries Journal.*, vol. X, pp. 331-339.

are common to Lothal, Susa D,[1] Royal Cemetery at Ur,[2] Hissar III,[3] and Gawra stratum XIII.[4] Animal-headed gaming pieces resembling the Lothal specimens occur in Susa,[5] and Queen Hatchepsout's tomb in Egypt[6] along with gaming boards and dices. A three-legged bronze object from Susa D which is said to have been used as a weight is analogous to the three-legged terracotta gamesmen from Lothal A.

Circular gold pendants and beads, having one or more axial tubes, occurring in Lothal A are similar to those found in Ur Early Dynastic II and III[7], Troy II and Hissar III[8] (see Chap. XXII). They might have been imported from abroad. On the other hand, spacer beads of gold, terracotta, copper and steatite are native to the Indus valley and seem to have travelled to the Mesopotamian centres. The Royal Cemetery at Ur and Cemetery A at Kish have yielded spacer beads of gold with five to ten holes.[9] Beads with trefoil pattern which is considered to be a special symbol of the Indus civilization occur in Ur also (Chap. XXI). Among other miscellaneous objects of foreign origin a terracotta head of a male with a square-cut beard, bald head, sharp projecting nose and slit eyes (pl. CXCV, A) found in Lothal A may be mentioned. Its features are essentially Sumerian, although the slit eye is not common in Sumer. The terracotta figurines of a gorilla and a miniature mummy from Lothal (pl. CXCV D) suggest contacts with Egypt. It may be recalled that the painted pins of ivory and bone, and gamesmen with ivory handle occurring in the Egyptian tombs bear resemblance to those from Lothal.

A lot of perishable material must have been exported from the Indus valley and Saurashtra to Mesopotamia. Among them cotton was important. More durable ones included shell and ivory objects and stone beads. Chank-shell is available along the rocky coast near Dwaraka and Jamnagar and other varieties of shell were imported into Lothal from south India for manufacturing bangles, beads and inlays for domestic consumption as well as export purposes. Lothal has yielded a large quantity of shell-bangles and a disproportionately large quantity of shell-flakes, rejected columella and partly-finished objects, suggesting an export trade in shell. Inlays, bangles, gaming pieces and ornaments characteristic of the Harappa Culture found in Susa, Ur and Brak must have come from Lothal and other centres (pls.CCLXXX-CCLXXXII, Chap. XXII).

Ivory was another commodity exported from the Indus cities. Carved hair-pins and khol-rods (pl CCXCII) found at Ur and Ras Shamra may be traced to Lothal, while ivory combs might have gone from the Indus valley.

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[1] In the reserve collection of the Louvre Museum.

[2] Woolley, *op. cit.* (1934) II, pl. 95. 10478 and pl. 158a.

[3] E. F. Schmidt, *Excavation at Tepe Hissar* (Philadelphia 1937), pl. LXX, 4086.

[4] Tobler, *op. cit.* (1950) II, pl. LXXXIV a,

[5] In the reserve collection of the Louvre Museum.

[6] Edward Falkener : *Games, Ancient and Oriental* (Lond. 1892) pp. 20-41.

[7] Woolley *op. cit.* II (1934) pl. 95.

[8] Schmidt *op. cit.* (1937), p. 229, pl. LXVI.

[9] Mackay *op. cit.* I (1929), pl. II, p, 59; pl. LX.

2. CULTURAL CONTACTS

A. Provincial Style of Painting

Trade often results in an exchange of ideas between the trading communities. Being a port-town Lothal was open to various influences from overseas stations. The Lothal people developed a new style of painting earthenwares by depicting animals in their natural setting in a realistic way. The fish-eating birds, the stag standing below a tree, the cranes walking in pairs and the birds fluttering in the air or chasing one another (See Chap. XVII) are good examples of this style. The absence of stylisation and overcrowding of motifs, the smooth flow of lines and introduction of narratives are other features which distinguish the Provincial Style from the Harappan. The close resemblance between the themes of the Provincial Style and those noticed on the West Asian pottery is remarkable[1]. e.g. fish-eating birds are painted on the vessels from Gaza IV and Ras Shamra (Ugarit III) on the Syrian coast. An antelope looking back over its shoulder seen on a jar from Sialk Necropole B is reminiscent of the antelope on the miniature S-shaped vase from Lothal (pl. CLXXIVB), and the copper tablets from Mohenjo-daro and Harappa. Wheat plant and other vegetable motifs painted on the Micaceous Red Ware from Lothal (pl. CLXXIVA) are comparable to the vegetable motifs on the vessels from Susa I, Giyan IV and Arpachiya. A bird sitting on a twig and holding a fish in its beak painted on a sherd from Lothal B (pl. CLXXVIID) reminds of a similar motif from the Diyala region. The very treatment of the subject in the Provincial Style is so different from that of the Indus Style that we are inclined to say that local genius played an important role in Lothal. The fish-eating bird and other motifs are traceable partly to the North Syrian coast, (Gaza and Ras Shamra) and partly to Northern Mesopotamia, especially Diyala and to Elam. But the Lothal folk did not blindly copy everything. They made use of the new themes and developed their own style of painting.

B. New Cults

A scene carved by a local Sumerian artist on a vase recovered from the Early Dynastic III levels of Tell Agrab, a ruined city on the Diyala is said to depict the celebration of an Indian cult apparently in a local shrine in Akkad. Some of the games such as *chaupat* and chess in West Asian cities may have an Indian origin. Similarly the foreign merchants who visited Indian ports appear to have brought with them new ideas and cults and introduced useful arts into Kathiawar. Joint burial may be an example of a new funerary pratice introduced at Lothal. The bull amulet is an indication of belief in magic, while snake-worship is suggested by the painting of snakes on earthen wares. It may also be remotely

[1] For comparison with West Asian motifs see Chapter XVII.

connected with snake-sacrifices prevalent in Bahrain[1] and snake worship in Gumla in Gomal valley of Baluchistan.

According to Mainkar the unit of the second series of weights from Lothal corresponding to the unit in the Heavy Assyrian shekel (8.37gms) had its origin in the Indus valley and was used for international trade. Indian cotton had been in use in the kingdom of Sennacherib. During the reign of Solomon Arab merchants carried rice to Babylon.

The long list of goods and ideas exchanged between the Indus and Sumerian civilizations is impressive enough to conclude that the Harappans in general and the Lothal folk in particular had established firm commercial contacts with Mesopotamia in the sargonid period, since most of the firmly datable objects are assigned to this period. From the clay tablets of Ur it is learnt that ships destined for Meluhha, Makkan and Dilmun used to be moored in the harbour outside the capital in the time of Sargon of Akkad in *circa* 2350 B.C. However, during the Third Dynasty of Ur direct trade with Meluhha, which formerly supplied copper, stone, wood and ivory objects had ceased.

It is not unlikely that the authors of the clay tablets of Ur referred to the Indus valley and Kathiawar in mentioning Dilmun, Makkan or Meluhha. If it is so, Lothal, which had better trade contacts with Mesopotamia than any other Harappan port in the sargonid period and later too (2300-2100 B.C.) can reasonably be supposed to be "the wealthy maritime region lying to the east of Sumer, which the Sumerian poets could describe as the place where the sun rises".[2] Lothal which could supply stone beads and ivory artifacts referred to in the clay tablets of Ur and Nippur was more easily accessible to the merchants of Ur than Harappa and Mohenjodaro which are far away from the cost. Recently an Indus seal has been found at Nippur. Harappan seals are reported from Balakot also.

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[1] G. Bibby *Four Thousand Years Ago* (Knoff) New York, 1961.

[2] S. N. Kramer 'Dilmum - Quest for Paradise' *Antiquity* vol. XXXVII (June 1963) p. 113.

CHAPTER XIV

CONCLUSION

1. ORIGIN OF THE HARAPPA CIVILIZATION

PRE-HARAPPA CULTURES

BALUCHISTAN

Until recent years it was generally believed that the Harappa Civilization appeared suddenly as a full blown civilization in the Indus valley and elsewhere, but archaeological explorations since 1950 in Baluchistan, Gujarat, Rajasthan, Haryana and Punjab have brought to light new facts which necessitate a revision of this view. A number of "Pre-Harappan" settlements have been traced below settlements of the Harappa Culture. A word of caution is necessary here in using the term "Pre-Harappan". What is "Pre-Harappan" at Kalibangan and Kot-Diji need not belong to the same cultural mileau as the Pre-Harappan at Amri or Siswal and Mitathal and much less at Gumla and Lothal. Secondly the Harappa Culture arrived at different times at different stations even in Gujarat and Rajasthan. In fact it is the Late Harappa Culture which succeeds the indigeneous cultures at Somnath (pp. 34-36) etc. In such cases the term 'Pre-Late Harappan' is more appropriate. In a few other sites such as Surkotada the Pre-Harappa and Late Harappa cultures are not clearly distinguished. The presence of the evolved Harappan ware, the Reserved Slip Ware and the Harappan Ware in one and the same period creates confusion. The Late Harappan level of Surkotada will have to be separated from the mature Harappan level which itself should be separated from the Kot-Diji Ware level on the one hand and the painted black-and-red ware level on the other.

Another confusing factor is the use of the term 'Early Harappa' by Mughal for the Pre-Harappa culture of Kot-Diji in Sind and extended to Kalibangan I in Rajasthan. The term 'Pre-Harappa' should be retained until we get evidence to prove that the Kot-Diji culture contributed the main elments to the Harappa Civilization namely town-planning, Indus weights, writing and seals. Some scholars attribute the beginning of the Harappa Civilization to the village cultures of Baluch Hills and the Pakistan-Iranian borderland; but it will be presently seen that the evidence is inadequate. The excavations of Pre-Harappan sites in this region vary from preliminary explorations by Stein and irregular diggings by Col. Jacob to scientific excavations by De Cardi[1]. At Nal (fig. 1) in a cemetery-cum-habitation site excavated by Hargreaves, the burials yielded painted pottery, copper and stone tools and beads. The animal motifs painted include humped bull, gazelle, ibex, fish-winged lion, etc. Some of them show Sumerian influence, while the pipal leaf motif

[1] Beatrice De Cardi 'Excavations and Reconnaisance in Kalat, West Pakistan', *Pakistan Archaeology*, No. 2, (1965), pp. 86-182.

can be traced to the Harappa Culture. Gordon identified Sohr Damb at Nal as a Kulli Culture settlement[1]. Here, the houses are of mud-bricks raised on rubble platforms. The painted ware is reminiscent of a similar ware found at Tepe Yahya in South Iran in Pre-Harappan levels which are dated much before 2500 B.C. Further south of Nal is Kulli on the Makran Coast where terracotta figures of bulls and Mother Goddess have been found. The female figure from Sohr Damb resembles the Kulli figure, but there is no definite evidence of Harappan and Pre-Harappan occupation at Kulli.

Shahi-Tump in the Kej valley is of particular importance because of a painted grey ware which was considered, till recently, a product of the post-Horappan chalcolithic folk who were presumed to have migrated to the Sarasvati (Ghaggar) valley and Ganga-Yamuna doab. They were even identified with the later Aryans. The scientific excavations carried out at Bampur[2] in Seistan and at Tepe Yahya[3] in south Iran have proved that the painted grey ware culture of Shahi Tump is earlier than the Harappa Culture, which is assigned to the second half of the third millennium B.C. At Shahi Tump the occurrence of a plain red ware, terracotta bulls and chert blades of Harappan origin is significant, but more important from the point of view of pre-Harappan period is the painted grey ware itself. The significant types in this ware are the dish and drinking cup which served as funerary vessels unlike the Painted Grey Ware of Indian Origin[4] which was used exclusively for non-funerary purposes. Secondly, the Indian Painted Grey Ware is post-Harappan in date whereas the Shahi Tump grey ware is pre-Harappan and both differ in finish and fabric. The Shahi Tump Ware shows greater affinity with the ware in Susa and Baluchistan than with the Indus valley pottery.

Dabarkot[5] in North Baluchistan is no doubt an important Harappan settlement. Though Iranian influence is seen in some of the pottery shapes and motifs, the Harappan pattern of construction on platforms and the lay-out of a citadel are significant.

Rana Ghundai[6] near Loralai in Baluchistan is another important site where Brig. Ross recognized five cultural phases (A to E), the earliest of which is noted for the presence

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[1] D. H. Gordon *The Prehistoric Background of Indian Culture* (Bombay, 1958), p. 39. Also see H. Hargreaves *Excavations in Baluchistan* 1925, *Bampur Mound, Mastung Sohr damb, and Nal*—Memoirs of the Archaeological Survey of India, No. 35, (1929).

[2] Beatrice De Cardi 'The Bampur Sequence in the 3rd Millennium B. C.,' *Antiquity* Vol. XLI pp. 34-41.

[3] C. C. Lamberg—Karlovsky 'The Proto—Elamite Settlement of Tepe Yahya' *Iran* Vol. 9 (1971), pp. 87-96.

[4] (Sir) Aurel Stein *An Archaeological Tour in Gedrosia*—Memoirs of the Archaeological Survey of India No. 43 (1931).

[5] (Sir) Aurel Stein *An Archaeological Tour in Waziristan and Northern Baluchistan*—Memoirs of the Archaeological Survey of India, No. 37 (1931). Also see Walter. A. Fairservis Jr. 'Archaeological Surveys in the Zhob and Loralai Districts, West Pakistan', *Anthropological Papers of the American Museum of Natural History,* Vol. XLVII, pt. 2 (1959).

[6] E. J. Ross 'A Chalcolithic Site on Northern Baluchistan' *Journal of the Near Eastern Studies*, Chicago. Vol. V. 1946, pp. 284-317. Also see Beatrice De Cardi 'Excavations and Reconnaissance in Kalat, West Pakistan' *Pakistan Archaeology* (Karachi) Vol. 2, No. 2, pp. 86-182, and Walter. J. Faviservis Jr. (1959) *op. cit.* p. 329*ft.*

of animal bones especially of domesticated Indian Ox and horse (onegar), the latter occurring in plenty in Surkotada[1] throughout the occupation period. In the subsequent occupation level bull and black buck are two frequently occurring motifs painted on vases. Although the shape of the vase is Iranian, the bull motif is Indian. The next phase of Rana Ghundai is contemporary with Harappa.

Siah Damb[2] is a small settlement in central Baluchistan excavated by Miss De Cardi. The earliest ceramic wares of Siah are the red-slipped basket-marked ware and the burnished grey ware. Even though the settlement was not destroyed, nor is there any sign of newcomers in period III of Siah, new ceramic wares make their appearance confirming thereby that transformation of a culture can take place without foreign impact. Among the new wares the Togau Ware is important. An open bowl is the main type in this ware which undergoes changes in shape and size. A parallel can be drawn from the bowls that undergo change in Lothal B and Rangpur II B-II C (above p. 34). The decoration on Togau bowls consists of processing caprids and birds as also linked human figures. The animals show variation from phase to phase. 'The horned frieze' is another decorative motif common to Siah-Damb, Kile Gul Mohammad and Mundigak (Afghanistan). The significance of the occurrence of the 'horned frieze' nearly 800 years later at a far removed site like Navdatoli in Central India along with the motif of 'linked human figures' is often over emphasized[3]. In fact, the linked human figures are found painted in the prehistoric (Neolithic-chalcolithic) rock shelters near Hampi on the Tungabhadra river in Karnataka. Hence we need not look to Iran, Afghanistan or Baluchistan for inspiration for the motifs on Navdatoli pottery. Besides Togau and Amri wares a cream slipped ware and two bichrone wares were in use in Siah III. Period IV witnessed the continuance of all these wares. The Anjira Ware which makes its appearance for the first time in Period IV occurs along with the Amri Ware in Sind and in the Pre-Harappan level at Kalibangan. Siah and Anjira[4] are noted for a very large variety of painted wares which provide links with Nal and Kulli on the one hand and Sind and Rajasthan on the other during Harappan and pre-Harappan times.

On the Afghan-Pakistan border two important sites, namely Gumla[5] and Hathala[6] (about 20 miles from Dera Ismail Khan) in the Gomal valley have been excavated by Dani. The Harappan settlement in Period IV of Gumla overlies an occupation level of Kot-Diji culture (Period III), which is said to have been preceded by a culture (Period) introduced from Afghanistan. Both Harappan and pre-Harappan settlements are said to have suffered violent destruction at Gumla, but Mughal has emphasized the continuity

[1] J. P. Joshi 'Transformation of Harappa Culture in Kutch: Examination of Evidence from Surkotada' *Archaeological Congress and Seminar* 1972 (ed. U. V. Singh, Kurukshetra, 1976) p. 43.

[2] De Cardi (1965) *Op. cit.* p. 104.

[3] H. D. Sankalia, *The Prehistory and Protohistory of India and Pakistan* (Poona, 1974), p. 456, fig. 164.

[4] De Cardi (1965) *op. cit.*; also De Cardi (1959) 'New Wares and Fresh Problems from Baluchistan' *Antiquity* Vol. XXXIII pp. 15-24.

[5] A. H. Dani 'Excavations in the Gomal Valley' *Ancient Pakistan* (Peshawar, 1970-71). No. 5.

[6] *Ibid.*

of ceramic traditions (below p. 256). The occurrence of long chert flakes, the white painting on pottery and the painted carinated cups similar to those in Mundigak are said to indicate the arrival of Period II people from southern Afghanistan. According to the excavator this village culture developed into a city culture as evidenced from the structures and portable finds from Kot-Diji in Sind, Saraikhola[1] in Punjab and Jalilpur[2] near Multan. Dani prefers to call this culture a "Serpent Worshippers Culture" on account of a large number of terracotta figures of serpent goddess found at Gumla and other sites. "The bull head" painting labelled as "horned deity" is an important motif at Gumla. It occurs in Hissar III, Mundigak, Kot-Diji and Kalibangan. Sankalia thinks that "it is this bull deity which is almost fully represented in the seals from Mohenjo-daro" and adds "if so, we get some real insight into the antecedents of the Harappan culture or the Indus civilization"[3]. But it should be borne in mind that neither at Gumla and Hathala nor at any other Baluchistan site there is any evidence of an urban discipline and town-planning which are the hall-mark of Indus towns and cities. Even at Kot-Diji the pre-Harappan culture does not exhibit important features of the Harappa Civilization such as gridded plan of the town and use of seals, Indus script, stone weights, etc. It is therefore evident that at Gumla, Hathala, Kot-Diji and Rahman Dheri[4] the pre-Harappa culture does not seem to have made substantial contribution to the development of urban life in the succeeding period, namely the Harappan. If the violent destruction of the pre-Harappa cultures at Hathala, Gumla and Kot-Diji is attributed to the Harappans, elsewhere the picture is entirely different. Before examining the evidence from Rajasthan and Gujarat, mention may be made of the destruction of Harappan settlement at Gumla (Period IV) attributed by Dani to the Gandhara Grave Culture people (below p. 256), who practised sacrificing animals and burying them with the cremated remains of human beings. Among terracotta figures found in the grave pits the horse is also seen.

SIND

As far as Sind is concerned both Amri and Kot-Diji are sites noted for a pre-Harappan settlement succeeded by the Harappan. Casal[5] who excavated Amri between 1959 and 1962 has distinguished the "pre-Harappan" (Period I) from the "Harappan" (Period II) and the "Main Harappan" (Period III). He noticed four sub-periods A to D, each in the pre-Harappan and Main Harappan. According to the excavator Amri I, which came into existence before 2500 B.C., derived more from Afghanistan than Kot-Diji I did.

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[1] M. R. Mughal *Explorations in Northern Baluchistan*, 1972: *New Evidence and Fresh Interpretation Second Annual Symposium on Archaeological Research in Iran* Tehran 1973.

[2] M. R. Mughal 'New Evidence of the Early Harappan Culture from Jalilpur, Pakistan' *Archaeology* (New York, 1974), Vol. 27 (2).

[3] H. D. Sankalia (1974) *op. cit.* p. 353, fig. 88k.

[4] A. H. Dani *op. cit.* Excavations by Durrani yielded potsherds being Indus signs.

[5] J. M. Casal *Fouilles d' Amri* (Librarie C. Clincksieck, Paris, 1964).

Amri IB-IC is equated to Togau D and Amri IC with Kile Gul Mohammed III-IV and Mundigak III. Amri II witnessed Harappan influence as indicated by the fish-scale motif and a ring-footed jar. A carinated bowl with a sagger base occurring in Amri II can be compared to a bowl from Navda Toli. A mud rampart is another important feature of Amri II comparable to the one at Lothal in phase I of Period A. The "Main Harappan" occupation of Amri (Period III C) is noted for the use of steatite seal, Indus script, Indus goblet, etc. The treatment of pottery is varied. The Harappan technique is limited to a few vessels, others showing use of reddish brown and pinkish-violet colours. The designs are drawn with a heavy brush unlike in the Harappan. Period IIID is equated to Jhukar Culture, which Casal calls as 'degenerate Harappan'. The main question is whether the gradual development of the urban discipline of the Harappa Civilization is traceable to Amri I through Amri II. The answer is that except for a few motifs and pottery types the pre-Harappa culture of Amri I cannot be said to have contributed the main elements of the Harappa Civilization, nor can Amri II be said to have evolved town-planning and writing.

Kot-Diji[1] is perhaps the most important pre-Harappan site in Pakistan. It is situated 15 miles south of Khairpur in Sind and was excavated by F. A. Khan who thinks that it anticipated the Harappa Culture. The use of mud bricks for properly oriented houses, whose dimensions are however not known, the construction of a fortification wall and bastions and the presence of community ovens may suggest some kind of planning and the nucleus of a town. The Kot-Diji pottery has very little to do with the typical Harappan Red Ware in surface treatment. The wide bands of black or sepia round the neck of jars and bowls and the gradual development of wavy lines and single loops into complex ones distinguish the Kot-Diji Ware from the Harappan. The dish-on-stand is squattish while the straight cylindrical vases are delicate. Beakers also make their appearance here but the absence of long chert blades should be noted. Small notched blades of Chalcedony which suggest hafting, the knife blades used for reaping and the leaf-shaped arrow heads are among the stone tools used by Kot-Dijians. Terracotta bangles and beads were the main ornaments. The absence of beads of semiprecious stones is significant. Khan is of the view that the artist who produced the terracotta bull with short horns, stout muzzle and round eyes was inspired by similar figures in the Scarlet Ware period of Susa (2800-2600 B.C.). It is worth mentioning here that the grassy vegetable motifs of Scarlet Ware are noticed on the Micaceous Red Ware of Lothal A, which is a pre-Harappan ware. Elamite influence in painting a few motifs or modelling terracottas in the essentially indigeneous pre-Harappa cultures of Kot-Diji and Lothal need not be ruled out. Sankalia calls Kot-Diji a pre-Indus town, but planning of a town as such is not evidenced here. The Kot-Dijians had no knowledge of writing and trade mechanisms such as seals and weights. When the Harappans arrived they introduced writing and weights as well as pottery painted in Indus style.

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[1] F. A. Khan 'Excavations at Kot Diji' *Pakistan Archaeology*, No. 2 (1965), pp. 11-86.

RAJASTHAN AND HARYANA

As we turn to the eastern province of the Harappa Civilization clusters of Harappan and Late Harappan sites overlying pre-Harappan deposits are noticed. Among them Kalibangan, Mitathal and Banawali (Vanawali) are important. Kalibangan was discovered by A. Ghosh and excavated by B. B. Lal and B. K. Thapar[1]. The excavators have distinguished two cultural periods here. The first settlement took place on a mound now termed as KLB-1. The most striking features of this pre-Harappan settlement are the mud-brick fortification and construction of houses in proper alignment on either side of a lane or street indicating some kind of planning. The width of the fortification traced on one side of the habitation was increased from 6ft. to 14ft. probably to withstand the onslaught of floods. Such thickening was not necessary against insipid missiles such as copper-tipped arrows and clay sling-balls which do not penetrate through mud-brick walls. Furthermore, it is only the north-south arm that is traced and it does not take any turn to enclose the habitation. The pre-Harappans may be credited with anticipating the Harappans in building a fortification wall, laying out houses in an orderly way, using headers and stretchers in masonry work, copper and shell bangles for ornaments, wheeled carts for transport and painting pipal leaf and fish scale on pottery. But they differ from the Harappans in a number of ways. For example, the former used short blades of agate and chalcedony as against long blades of chert used by the Harappans. They had not yet acquired knowledge of etching beads and making faience. In fabric and decorative pattern the pre-Harappan pottery is different from the Harappan. A rusticated and painted ware is noted for naturalistic motifs such as the deer with back-sweeping wavy horns or with curved horns as in the case of a burchranian. In ceramic types, too, the characteristically Harappan shapes, especially the perforated cylindrical jar, the jar of 'S' profile, the goblet and dish-on-stand, were not produced by the pre-Harappans. In fabric and types such as the footed cup and the bowl the ceramic wares are closer to Amri and Kot-Diji wares.

The pre-Harappa culture of Kalibangan I was not confined to the Ghaggar river. It extended into the Chautang and Sutlej valleys also as is now evident from the excavations undertaken by Suraj Bhan at Siswal and Mitathal[2]. Siswal A (pre-Harappan) is equated to Mitathal I and Kalibangan I (pre-Harappan) and Siswal B to Mitathal IIA and Kalibangan I (Harappan). Mitathal II B represents the degenerate Harappa or Late Harappa Culture. Siswal A is noted for the occurrence of fabrics of Kalibangan I besides the use of white pigment for painting. Incised decoration and the presence of the black-on-red painted ware are other features of this phase.

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[1] B. K. Thapar 'Synthesis of the Multiple Date from Kalibangan, *Radio Carbon and Indian Archaeology* (Bombay, 1973, Eds. D. P. Agrawal and A Ghosh).

[2] Suraj Bhan *Excavation at Mitathal* (1968) *and other Explorations in the Sutlej—Yamuna Divide* (Kurukshetra 1975) pp. 12 and 103*ff.*

GUJARAT

In Kutch a few ceramic types of pre-Harappa culture (as evidenced at Kalibangan and Kot-Diji) are found in Harappan levels at Surkotada indicating the survival of the earlier ceramic types. The citadel complex is significant for use of rubble for wall-footing and the introduction of bastions in the fortification. The Reserved Slip Ware of Sargonid age is said to occur in Surkotada, but the C14 dates indicate that it is "datable not earlier than 2000 B.C"[1]. Obviously the Harappans arrived here much later than they did at Lothal. Hence they cannot be said to have landed first at Surkotada by whatever route they might have taken from Sind and then moved on to Lothal across the land mass of Kutch and the swamps of the Little Rann. The theory of earlier landing at Surkotada cannot be maintained in the light of the C14 dates of Lothal phase III B (2082+130 B.C.), which is preceded by two distinct phases of mature Harappan occupation and six building sub-periods. The first phase is of initial village settlement and the subsequent one is a well planned port-town in Circa 2350 B.C. Phase I B of Surkotada which witnessed "deterioration in pottery (Harappan) fabric" should be equated to Lothal B. Phase I C noted for the white painted black-and-red ware of Ahar type had already come in contact with central India. Further, the occurrence of a terracotta seal with Indus Script but no animal in phase I C is a clear proof of the continuance of Indus writing in the Late Harappan period also. Surkotada is important for three reasons; first, for the late arrival of Harappans and the short span of Harappan town with a citadel complex (2050-1940 B.C.), second for the use of the Indus script in the Late Harappan period (1700 B.C.) and lastly for the cultural affinity with the Ahar Culture. At the last mentioned site Late Harappan and Lustrous Red ware types have been noticed.

At Lothal itself an indigenous culture namely the Micaceous Red Ware Culture may be said to precede the Harappa Culture, the main reason for such an assumption being the scarcity of Harappan wares in contrast with the abundance of the Micapeous Red Ware in the lowest levels (above p.). Owing to the difficulties presented by subsoil water it was not possible to separate the pre-Harappan occupation levels from the Harappan (above p.). The Micaceous Red Ware is wheel-turned and thin-walled. It is red to pinkish in colour the distinct types being the incurved round-bottomed bowl with or without a stud-handle and the small-necked jar with a flaring rim. The associated black-and-red ware, a product of the inverted firing or double firing is another distinguishing fabric of indigeneous culture of Lothal. The bowls in the ware are often painted in white on the interior. The inhabitants had built a mud fortification, a feature noticed in the pre-Harappan settlements at Kot-Diji and Kalibangan also. Although the plant motif painted on the Micaceous Red Ware bowls and the surface treatment of the vessels can be said to compare favourably with the Scarlet Ware of Susa, the ceramic types are distinctly indigenous. They used short blades of chalcedony and jasper and delicate copper tools such as the needle with a round section having an eyelet at the thinner end (No. 983, fig. 111). The use of burnt brick was known but owing to very limited digging

[1] H. D. Sankalia (1974) *op. cit.* p. 360

the house plans could not be ascertained. The pre-Harappan folk of Lothal worked ivory and shell. The Harappans borrowed some of the indigeneous ceramic types which they produced in their own sturdy red ware. The Micaceous Red Ware continued to be in use for a long time in the Harappan period. Bead-making was an important indigeneous industry which was further developed by the Harappans. The Micaceous Red Ware Culture is noticed at Rangpur also though not in a separate horizon.

Somnath on the southern coast of Saurashtra is found to have been occupied by an indigeneous folk before the Late Harappans came to settle down in circa 1800 B.C[1]. The main ceramic industry is the 'coarse red grey ware' in which the *kunda* with flaring sides is an important type. The Late Harappan ware, the black-and-red ware of the fabric and type found in Lothal A and the red-slipped ware are other associated wares of this period. The stone tools comprise short blades of chalcedony and jasper.

From the details of the material equipment of the pre-Harappan cultures of Baluchistan, Sind, Punjab, Rajasthan and Gujarat mentioned above it can be concluded that none of them had any knowledge of writing and trade mechanisms such as seals and weights which presuppose a high degree of literacy and regulation of trade. The characteristically Harappan ceramic types are not traceable in the Kot-Diji, Kalibangan and Micaceous Red Ware Cultures. It is only the dish-on-stand, dish and beaker that occur in Sind. The Harappan chert blades are unknown to the pre-Harappans. On the credit side the knowledge of building fortifications and platforms and the use of the so-called 'English-bond' in brick masonry should be mentioned. So far as religious practices are concerned the worship of the bull and Mother Godess may be noted. The pipal leaf and horned deity are also attributable to the pre-Harappans. Hence we may conclude that certain minor features of the Harappa Civilization had their origin in the antecedent indigeneous cultures of Gumla, Kot-Diji, Kalibangan and Lothal. Even though the mere construction of houses in a row as at Kalibangan does not necessarily imply town-planning it may be conceded that orderliness in the lay-out of a pre-Harappan village is itself significant. The Harappan practice of extended burials has not come to notice in these antecedent cultures. However what is significant is the practice of sacrificing animals which is continued by the Harappans at Lothal and Kalibangan. Similarly post-cremation burial of Harappa seems to have had its origin in the pre-Harappan cultures. It must be admitted that roots of the Harappa Civilization are being traced in the Indian sub-continent. The question that still remains to be answered is 'who introduced the Indus script which is quit different from the Egyptian Hieroglyphs and the Sumerian cuneiform writing?' Let us hope that one day the earlier stages of the Indus writing which is presented in the Indus cities of Harappa and Mohenjodaro as a full-fledged phonetized script will be traced soon.

2. AUTHORS OF THE HARAPPA CIVILIZATION

The language and racial composition of a population are necessary for determining the authors of a material culture. The most important source of information for ascertain-

[1] H. D. Sankalia (1974) *op. cit.* p. 381 *ff.*

ing the racial composition of the Harappans is the report of anthropologists who have examined the human skeletal remains obtained from the ruined streets and houses of Mohenjo-daro, from Cemetery R 37, Cemetery H and Arĕa G of Harappa and the cemetery at Lothal. The reports on skeletal remains from Kalibangan and Rupar, when published, may throw some more light on the ethnic affinities of the Harappans. For the present a summary of the ethnic features of the people of Mohenjo-daro, Harappa and Lothal detailed in the respective reports is given below :—

Mohenjo-daro	Harappa		Lothal	
From streets & ruined houses. Mature Harappa Culture. 2500-1900 B.C.	Mature Harappa Culture 2500-1900 B.C.	Late-and port-Harappa Cultures 1900-1700 B.C.	Mature Harappa Culture Lothal A 2450-1900 B.C.	Late Harappa Culture Lothal B 1900-1600 B.C.
1. *Group A* Proto-Australoid or caucasic or Veddoid 2. *Group B* Mediterranean 3. Alpine 4. Mongoloid branch of Alpine	*Cometery R.37* *Type A.* Same as Mohenjo-daro Group A, but 5 skulls designated proto-Nordic or Caspain *Type A.1* Same as Mohenjo-daro Group B, but redesignated Caspian or Indo-European. *AREA G* *Type A1* Same as A1 above. *Type B1* Same as Hissar III (round-headed) designated Alpine. *Cometery H* *Stratum II* Type A and Type A1 as above. *Type B2* round-headed (variant Alpine)	*Cemetery H* *Stratum I* *Type A2* Smaller form of Mediterranean	*Group I* Alpine similar to Sialk designated Aryan *Group II* Brachycranial Armenoid	*Group I* Same as Lothal A *Group II* Armenoid similar to Sialk *Australoid*

In classifying man into races Anthropologists have taken mainly physiological factors, shapes and proportions of skulls, prognathism etc. Their attempt to bring into the physiological framework other factors such as the language, social institution and the material equipment which also count in classifying man into races has not been very successful. Herbert Risley[1] divided the Indian population into seven groups while Guha[2] recognized 'six main races with nine sub-types'.

1. The Negrito
2. The Proto-Australoid
3. The Mongoloid
   (i) Palae-Mongaloids, both long-headed and broad-headed.
   (ii) Tibet-Mongoloids
4. The Mediterranean
   (ii) Palae-Mediterranean
   (ii) Mediterranean
   (iii) Oriental type
5. The Western Brachycephals
   (i) Alpinoid
   (ii) Dinaric
   (iii) Armenoid
6. The Nordic

Although Sarkar[3] has objected to this classification, we may retain it for want of a more satisfactory one. One may however agree with him in preferring the term 'Australoid' to 'Proto-Australoid'.[4]

It is often pointed out that the Cemetery 'H' (Post-Harappan) people destroyed the Harappan city at Harappa, but this is now disproved by the stratigraphic break between the Harappa and Cemetery H cultures.

Be that as it may, ethnically speaking, the Cemetery H Stratum I (post-Harappan) population reveals a new weakly mesocephalic type designated A2 (a smaller form of classic Mediterranean type). In addition to A2, a few long-headed skulls resembling Type A of Cemetery R37 and a round-headed type closer to Type B2 of Cemetery H Stratum II are also found in Stratum I. Though the Harappa Civilization is widespread the anthropologists Gupta Datta and Basu[5] have observed that "the Harappan population

[1] B. S. Guha in Mackay *Further Excavation at Mohenjodaro* (1938).

[2] S. S. Sarkar *Ancient Races of Baluchistan, Punjab and Sind.* (Calcutta, 1964) p. 15*ff.*

[3] *Ibid.*

[4] P. Gupta, P. C. Dutta and A. Basu *Human Skeletal Remains from Harappa*—Memoirs of the *Anthropological Survey of India No.* 9 (Calcutta, 1962).

[5] S. S. Sarkar *Ancient Races of the Deccan* (Delhi, 1972).

of Mohenjo-daro has similarities with the present-day long-headed population of Sind, so far as the cephalic index is concerned. The same relationship holds between the ancient population of Harappa and the present-day population of the Punjab. The skulls from Lothal (Sarkar 1972)[1] are on the average round-headed (79, 68; value calculated by us on seven better preserved skulls). This is remarkably close to cephalic index of the present-day inhabitants of Gujarat. The differentiation in regard to cephalic index observable in the Harappan is remarkably similar to the differentiation in the present-day population in the corresponding areas. In other words, the population of this widespread region (Punjab to Gujarat) has remained more or less stable since Harappan times". They add that "in the case of Harappa although cultural change is marked, yet it does not seem to have been the result of large scale invasion, the physical types remaining, more or less, constant. We can therefore suggest that even if there were invasion, the number of invaders must have been too small to bring about marked changes in physical, or that most of the changes were due to cultural forces of internal origin". The cultural changes noticed in the Late Harappan period in Gujarat, northern Deccan and the Ghaggar. Chautang and Sutlej valleys are the result of readjustment of the Harappans to the new environment and changed economic and social conditions, but not due to foreign invasion. There is not much of a variation in the population content of Lothal B from that of Lothal A, though the cultural change is obvious. In both the periods ethnic Groups I and II comparable to the respective ethnic groups II and IV of Sialk existed at Lothal. Vallois[2] has labelled the former as "Aryan' and the latter as 'Armenoid'. The ethnic affinities between the Harappan population in the Indus valley, Hissar and Giyan is well known. On the whole, it can be said that the Indus population was a mixed one and comprised the ethnic groups normally labelled as 'Aryan' besides two others.

The linguistic groups usually associated with particular ethnic groups in India[3] may be noted here.

1. *Austric* spoken by the aboriginal tribes often mixed up with other peoples.
2. *Dravidian* spoken by the Palae-Mediterranean of the South e:g., Kannada, Telugu, Tamil and Malayalam.
3. *Sino-Tibetan* spoken by the Mongoloids of the North and North-east.
4. *Aryan* spoken by (i) the Mediterraneans of the Punjab and the upper Ganges valley who are tall and fair (ii) the socalled 'oriental type' with a long nose and fair skin found in the Punjab, Western U.P., Sind and Rajasthan (iii) the Nordics of North-Western Frontier Province, Punjab, Rajasthan and upper Ganges valley.

[1] S. S. Sarkar *Ancient Races of the Deccan* (Delhi, 1972).
[2] H. V. Vallois, *Les ossements Humais de Sialk* (Paris 1940).
[3] S. Chattopadhyaya, *Racial Affinities of Early North Indian Tribes* (Delhi, 1973).

Within any linguistic group there is often a diversity of racial types. The Aryan-speaking people are a mixture of the Mediterranean, the broad-head brachycephals and the Nordics. The Nordic Red Kaffirs, the Australoid Bhils and Palae-Mongoloid Gurkhas also speak the Aryan languages. Similarly the Dravidian is spoken not only by the Palae Mediterranean Tamilians and Andhras but also by the Alpo-Dinarics of Karnataka (including Coorg), the Negrito Kadars and Irulas and the Australoid Chenchus, Malsers and Gonds. The Austric languages are spoken by the Palae Mongoloid Khasis of Assam and the Mundas and Santals of central India.

The phonology of Harappan language as made known to us from the Indus seals shows some affinity with Hittite (centum group) and with the language of the *Avesta* (satem group) besides its close relation with the language of the *Rigveda*. Whether the language of the seals which belongs to the Indo-European family was that of the rulers only or of the common man also it is difficult to say at present. Chanda says that the "Purus, Druhyus and Anus mentioned in the *Rigveda* along with the Yadus and the Turvasas may have come from Western Asia (Syria) and were probably of the same physical type as the Mitannis and the Hittites having dark or brown colour". It is interesting to find that the Indus-seals mention the names Pṛ–Puru and Dṛh–Druhu. Referance has already been made to the affinity between the Hittite and Harappan languages (above p. 182). Chanda[1] thinks that the tribes like Yadu, Turvaśa, Anu, Druhyu and Puru belong to the Alpine group, and when in India they got mixed up with the Nordics. As we know for certain that the Alpine and Nordics formed, besides others, a part of the Harappan population and that the latter spoke an Indo-European language it is reasonable to conclude that an important section of the Harappan population belonged to that ethnic group which is called 'Aryan.' But no evidence, ethnic or otherwise, is available as yet to trace their original home. The Purus who are dubbed as *mṛdhravāc* by the Bharatas of the *Rigveda* seem to be the earlier Indo-European-speaking people whom the later (Rigvedic) Indo-European speaking Aryans met on the banks of the Purushni (Ravi)[2].

Obviously the older branch of Indo-European spoken by the Harappans represented by the Purus, Druhyus etc., of the *Rigveda* must have been archaic in comparison with the younger or more refined branch of the same language spoken by the Rigvedic Aryans. The peculiarities of the languages and difference in social and religious customs between the two groups might have led to some antogonism resulting in treating the earlier branch as an enemy.

The arguments advanced for giving the nomenclature 'non-Aryan', and to be more precise, 'Dravidian', to the Harappans are too well known to be repeated. The funerary practice of burying the dead, phallic worship, the cult of the Mother-goddess and the worship of Siva as Pasupati are said to suggest that the Harappans followed a religion which was essentially non-Aryan. But it may be pointed out that the Mother Goddess was not the principal deity of the Indus people. This cult was unknown in Kathiawar and rarely

[1] R. P. Chanda *The Indo-Aryan Races* (1969 Reprint, Delhi) pp. 29-33.
[2] *Ibid.*

followed in the Sutlej and Sarasvati-Drishadvati valleys. Apparently, the female element did not dominate the Indus religion all over. Similarly, the cult value of conical objects found at Mohenjo-daro and mistakenly called 'phallus' is highly doubtful. On the other hand the pipal tree motif noticed on seals and in paintings on pottery suggests an Aryan element in the religion of the Harappans, for, the dried twings of the *aśvattha* were used by Aryans for making the sacrificial fire. In fact one of the Indus seals depicts Agni coming out of the *aśvattha.*

Some further evidence which suggests that the religious belief of the Lothal people was similar to that of the Rigvedic Aryans may be noted here. Mention has already been made of fire-altars found at Lothal and Kalibangan (above p. 216 ff.). The Vedic Aryans also maintained and worshipped three fires, the pre-mordial, the domestic and the funerary. The *Rigveda* mentions the three *savanas* and the offering of *Soma.* The small raised platforms with a rectangular enclosure of baked bricks in the houses at Lothal, may be identified with the *Agniśāla* of the Vedic period. Another type of fire-altar consists of a shallow circular pit made in the floor of the house. Sometimes it is associated with rectangular fire-altars. Whether these two types were used for offering of milk to gods through fire *(Agnihotra)* as mentioned in the *Rigveda* or for a sacrifice of the *Darśapurṇamāsa* type is not known (above p. 217).

Another ritual similar to the Vedic rituals observed at Lothal is the animal sacrifice. The sacrificial altar, on which a gold disc *(rukma)*, a few potsherds, stone beads and charred bovine skeletal remains were found clearly suggests the performance of a sacrifice similar to the *Gavām-ayana* of the Vedic texts (above p. 218). A sacrificial pit is reported from Kalibangan also.

The funerary practices of the Harappans in the Indus valley and Kathiawar have been discussed elsewhere (above p. 140 ff.). It is generally believed that the Vedic Aryans, practised only cremation, but the *Śatapatha Brāhmaṇa* refers to burial also. In the early period both the funerary methods appear to have been in vogue, burial being given up in due course. It may be recalled that cremation was practised at Harappan sites such as Sutkagendor, Gumla, Hathal and Damb Buthi (above p. 141). Hence the Harappans and Vedic Aryans may be said to have practised both cremation and burial in varying degrees. The lack of knowledge of the horse and rice on the part of the Harappans which was considered to be another indication of their non-Aryan origin is no more valid. (above p. 219).

The language of seals, the ethnic affinities and religious practices of the Indus people indicate that a section of the population was "Aryan" in the sense in which certain writers have used the term. If religion is taken into account they were more Aryan than Dravidian, and if racial affinities alone are considered there was an admixture of "Aryan" and other elements.

3. END OF THE HARAPPA CIVILIZATION

Among the various reasons attributed to the desertion of the Indus cities, gradual dessication and sudden invasion by the barbaric tribes from the north-west are frequently

mentioned, but other more potent causes such as floods mentioned by the excavators have not received sufficient attention. It is now generally admitted that several forces were at work to bring about the end of the Harappa Civilization. We shall examine some of them here without trying to simplify the process in support of any particular theory. Deforestation of the hills and agricultural operations in the plains must have contributed to the wearing out of the landscape, but the real danger was from the floods which assumed great proportions in the lower reaches of the Indus and Sabarmati valleys.

In *circa* 2000 B.C. the river completely destroyed Lothal, silted up its flow-channel and swung about one mile west of the town. As a result of the change in the course of the river the dock went dry in phase IV and necessitated cutting a mile-long channel to sluice ships into the dock. In all, Lothal was destroyed five times and each time it was the flood that was responsible for the havoc. Elsewhere near Koth and Kanasutaria[1] the vagaries of the rivers are evident from the gravel and silt deposits accumulating through centuries in the third and second millennia B.C. as a result of the meandering nature of the rivers. The final destruction of the mature Harappa Culture at Lothal, Rangpur and Koth[2] was also caused by severe floods as is evident from the flood debris capping the latest occupation deposits at these sites.

The reasons for large-scale flooding in the Indus and Sabrmati valleys are more than one. The seven major re-buildings at Mohenjo-daro provide clear evidence of the struggle of the inhabitants against treacherous floods and rising water table. The rapid silt-deposition in the mouth of the Indus, as in the case of the Sabarmati, and the salinity of the soil were also responsible for the reaction of tidal marshes. The Director of Ports, Ahmadabad has observed in his report on the dock at Lothal that the enormous rate at which silt deposition is taking place in the Gulf of Cambay has rendered many ancient ports useless. The creation of tidal marshes must have reduced the navigability of the Indus Sabarmati, Bhogavo, Bhadar and Narmada rivers. The fast accumulating silt choked off some of the Harappan ports including Lothal and Bhagatrav. R.L. Raikes and G. F. Dales[3] who have done very valuable work on the hydrology of the Indus region and surveyed the Makran coast have brought to light that coastal uplifts on the northern margin of the Arabian sea were responsible for the floods and heavy silting in southern Mesopotamia in the third millennium B.C. Perhaps the same phenomenon was responsible for the periodical ponding back of flood waters in the Indus and Sabarmati estuaries thus causing heavy floods and swamps. Raikes[4] has observed that river courses near

[1] S. R. Rao (1973) *op. cit.* p. 179

[2] *Ibid.*

[3] R. L. Raikes and R. H. Dyson 'The Prehistoric Climate of Baluchistan and the Indus Valley' *American Anthropologist* (1961), Vol. 63 pp. 265-281; R. L. Raikes, 'The End of the Ancient Cities of the Indus' *American Anthropologist* (1964), Vol. 66(2) pp. 284-299, M. R. Sahni 'Bio-Geological Evidence Bearing on the Decline of the Indus Valley Civilization', *Journal of the Palaeontological Society of India*' (1956), Vol. I pp. 101-107; G. F. Dales in *Scientific American* (1966) Vol. 214(5) pp. 93-98; G. F. Dales and R. L. Raikes, 'The Mohenjo-daro Floods: A Rejoinder', *American Anthropologist* (1968), Vol. 70 (5), pp. 957-961.

[4] R. L. Raikes, 'Kalibangan: Death from Natural Causes', *Antiquity* (1968) Vol. 42 (168), pp. 286-291.

Kalibangan changed frequently due to tectonic disturbances. Dales has also identified inland derelict beaches which suggest that Sutkagendor, Balakot[1] and Sotkakoh were also ports in Harappan times. Balakot discovered by Raikes was another coastal station. All these Makran sites are situated 8 to 35 miles inland. According to Dales the uplift of the coast, the alluvial build-up at the mouths of the Dasht and Shadi Kaur rivers and the building of beaches through the deposition of sand by wave action were responsible for the receding of the sea. Prof. Zeuner who examined some of the soil samples including sand collected from the pits near Gundi (4 miles north of Lothal) suspected an ancient beach here.

Whatever may have been the cause of floods in the Indus and Sabarmati estuaries it cannot be disputed that the floods had tired out the inhabitants of Mohenjo-daro, Chanhu-daro and Lothal and brought down civic standards. The lack of civic amenities, the shoddy construction of houses over flood-debris and the use of brick-bats for pavements and drains in Lothal B and the late levels of Mohenjo-daro[2] provide the necessary proof of poor standards.

Speaking of floods, Mackay observes "we have definite evidence of two floods one of which occurred at the level 22.4 ft. below datum, and the other earlier still. It would seem that on the re-occupation of the City on the first great flood, the large mound of rubbish.. came into being....The second flood which deposited a layer of sandy clay, some 2 ft. thick, we must correlate with the end of the Late III phase, at which time the city seems to have been entirely deserted. After its re-occupation, the type of house erected was in general very poor and the art of building steadily deteriorated to the end of the period".[3] The virtual destruction of Chanhu-daro took place as a result of the second flood; it was, however, re-occupied and the people lingered on for sometime until at last they disappeared from the scene. This is true of Lothal also. The flood at the end of phase IV destroyed the township. It was deserted for a while, but soon some inhabitants returned to the town and constructed shabby houses of mud and reeds. Speaking of the destruction of the Harappan settlement in Mound I at Chanhu-daro, the excavator says "It is not impossible that the flooding of the country by the Indus was so extensive, so frequent and so prolonged each time that the later inhabitants of Chanhu-daro were forced to make their way to lands of higher elevation, where they lived until their identity was lost."[4] Vats has also made similar observations about the buildings of the middle and late levels at Harappa. The debris sealing the Harappan occupation comprises silt, brick-bats and rolled potsherds in Mound I. M.R. Sahni's observations about floods in Sind are interesting. According to him 'the alluvium of the Indus left high and dry on a hillock known as Budh Takkar, much above the present river-bed must have been the result of exceptional floods in the Indus when the river rose

[1] G. F. Dales: *Excavations at Balakot, Pakistan, Fourth session* 1976, *Preliminary Report* (Berkeley 1977 (Cyclostyled copy).

[2] G. F. Dales 'New Investigations at Mohenjo-daro', *Archaeology* (New York, 1965), Vol. 18 (2), pp. 145-150.

[3] E. J. H. Mackey *Chanhu-daro Exacvations*, 1935-36 (New Haven, 1943) p. 63 *ff*.

[4] *Ibid.*

high submerging the surrounding country for miles'.[1] He holds this flood of long duration responsible for the sudden destruction of Indus cities.

The massive peripheral walls of mud-bricks with baked brick revetment built at Harappa and the mud-brick walls of Kalibangan appear to have been anti-flood bolsters. The purpose of building the peripheral *bund* and inner platforms at Lothal was to keep away the flood waters. Similar structures whether built of bricks or stones at other sites also appear to be anti-flood waters.

It is held by some scholars that the dessication of the Indus valley was the main reason for the end of the Indus Civilization. Against this theory Dales has argued that the Indus valley was not very much wetter in 2500 B.C. than what it is today,[2] but it might have been slightly more woodded and less desert-like.

On an examination of the wood specimens from Lothal and Rangpur the wood anatomists have concluded that the vegetation and, therefore, climate and rainfall of Kathiawar was not very much different about 4000 years ago from what it is today. Hence drastic changes in climatic conditions may not have been a major factor in bringing the Harappa Civilization to an end, although it is true that the devastating floods destroyed the process of irrigation and irrigated lands.

We may now examine what is generally called the invasion theory. Piggot[3] has argued at length that the destruction of Harappan settlements at Harappa, Mohenjo-daro, Chanhu-daro and other sites was due to invasion of the Aryans who came in large numbers with superior weapons, massacred the inhabitants, burned the cities and occupied them in *circa* 1500 B.C. He says 'unquestionable evidence of the arrival of newcomers at Harappa after the main phase of occupation of the city, is, however, afforded by the large cemetery H......'

On a re-examination of the data it is now admitted by all that the Cemetery H people arrived long after the Harappans left the city. Moreover, the Cemetery H culture is confined to a small area in the Punjab and cannot therefore be said to be widespread as the Aryan culture was.

Now about the massacre of the inhabitants of Mohenjo-daro. A careful perusal of the excavation reports shows that so-called 'massacre' did not necessarily take place in the final phase of the City. If at all there was any massacre it must have taken place either before the late phase or long after the buildings of the final phase collapsed. In this connection the statements of Hargreaves, the excavator who found fourteen skeletons of men, women and a child, some of them wearing ornaments of the Indus period is significant. He says that they were found in attitudes suggesting simultaneous and violent death. About the skeletons in Room 74 he observes 'Like skeletons 2, 5 and 9, part of the skeleton was over the southern wall of Room 74, proving that these remains are subsequent to the decay of the building in which they were found.' Marshall adds that 'this does not seem

[1] M. R. Sahni (1956) *op. cit.*

[2] G. F. Dales and R. L. Raikes (1968) *op. cit.* also see R. L. Raikes and D. H. Dyson (1961), *op. cit.*

[3] S. Piggot *Prehistoric India* (Pelican, 1961), pp. 214-215.

proven......It is quite likely therefore that the *skeletons belong* to the interval between the *Intermediate I and Late III Periods,* though the possibility of their posterior to the Late Period I may be admitted'.[1] It is therefore highly doubtful whether the skeletons belonged to the last phase of Harappan occupation. The stratigraphic evidence in the case of the skeletons found in a street in "VS Area" is equally uncertain about the phase to which they can be ascribed. Even supposing all the 21 skeletons including those from "HR Area" and "VS Area" belong to the last phase, which is not certain, the death may not be due to an attack on the city. The cuts on two skulls suspected to have been caused by an axe or sword are not a sufficient evidence of death due to violence on a large scale. In DK area the contorted position of five skeletons of children is also said to indicate the same cause. The entire evidence of the socalled massacre can be summarised thus: the death of 21 persons occured sometime between Intermediate I and Late III phases in Room 74 and in a street, perhaps due to the collapse of houses or riot and that two of the 21 killed had received fatal injuries with an axe or sword, and five skeletons of children were found in controted positions one may pause for a while to see whether this could be considered as sufficient evidence to postulate a theory of massacre of the defenders of a vast city like Mohenjo-daro and whether the destruction of the city and its civilization could be attributed to invasion. The circumstantial evidence is obviously too meagre. Secondly the absence of any skeletal evidence for an attack on the citadel itself and a still less convincing proof for occupation of the citadel by any non-Harappan group should be taken into account before imagining an invasion. In the event of an attack on the city heavier fighting is expected in the citadel and atleast a few instances of death due to violence should be expected from this area. But the facts do not support the hypothesis. Normally the invaders may be expected to have settled down at important city-centres, such as Mohenjodaro, where except for a shaft-tube axe-adze attributted to the newcomers, there is no evidence to substantiate the theory of invasion. At Harappa stratigraphy proves that the invaded were not present when the invaders arrived on the scene. At Lothal, Kalibangan and Rupar there is no evidence of any intrusive culture. As such no newcomers can be held responsible for destruction. In Lower Indus, the Jhukar culture people arrived at Chanhu-daro after the city was destroyed by flood and the Harappans (I C phase) had left the site. Other evidence, though of minor importance, adduced in support of the invasion theory may be examined here. The occurrence of a bronze axe at Rajanpur is said to indicate the route followed by the invaders but it has no direct bearing on the issue, as it is found in much later levels. The shaft-hole axe and stamp seals occurring in Shahi Trump Cemetery are said to represent the material equipment of the invaders. It may be recalled here that stamp seals bearing linear and geometric designs occur in the Intermediate levels at Mohenjo-daro and Sealings with impressions of stamp seals are noted in Lothal A in view of the contact between Harappan sites and Brak, Susa and Sialk right from the sargonid period. Moreover the painted grey ware of Sahi Tump Cemitery associated with stamp seals is found to be pre-Harappan in date (above p. 240).

[1] H. Hargreaves in (Sir) John Marshall, *Mohenjo-daro and the Indus Civilization* (London 1931), I.

Lately the Gaṇdhara Grave culture folk of Gumla have been held responsible by Dani for the destruction of the frontier settlement of the Harappans, but this argument is convinceingly demolished by Mughal[1] who is quoted below :

"Gumla is located on an important northerly route leading from the Indus plain to Baluchistan and beyond. Therefore, we find a commingling of several cultural traditions at Gumla, as is evident by the ceramic and other materials found in Gumla, II, III and IV levels. The whole body of material from Gumla II to IV is clearly linked with the Zhob, Loralai and Quetta valleys of Baluchistan, with the upper and central vally, and with southern Afghanistan and Iranian Sistan.

It should be pointed out that a critical study of the materials assigned to Gumla II, III and IV, however, reveals a different story and some conclusions drawn from its sequence by Dani may have to be revised. Seen in the light of the evidence found recently from Jalilpur II and Sarai Khola II, the whole material found in Gumla II and III TOGETHER fits very well, both chronologically and culturally, into the Early Harappan cultural phase of the Indus valley which preceded the Mature Harappan period. Numerous pottery forms and also other objects from Gumla II and III (and a part of IV) compare precisely with those from Sarai Khola II, Jalilpur II, Kalibangan-I, with the early levels of Harappa and Kot Diji. The non-Indus pottery of Gumla II-III, such as the 'wet' and 'Faiz Mohammad Wares', 'Periano Reserve slip', comb incised, black-and-white, 'Red-on-Red Slip', chocolate/brown and balck or black-on-red wares, are also comparable with the sites of northern Baluchistan dated to the early third millennium B.C.

Judging by most of the artifacts and pottery, Gumla IV clearly demostrates a continuity of cultural tradition from the early periods. Just as the Harappan traits occur in the early third millennium B.C. contexts in the Kot Dijian levels of Kot Diji, at Kalibangan-I and at Jalilpur (where mature Harappan is absent), the intersecting circular design painted with black-on-red, terracota 'cakes' and perforated wares, also appear in Gumla IV in association with the early materials. The characteristic Indus script and seals are absent at Gumla, as these are not yet reported from the sites of the early Harappan period. The appearance of such (mature) Harappan-like traits does give us a point in time when these elements had emerged or were appearing.

Prof. A. H. Dani thinks that the settlements of Gumla III ended violently, followed by an occupation by the Harappans. Ironically, the continuity of cultural materials as evidenced in Gumla II to IV levels contradicts such an assumption. Dani compares the stratigraphy of Gumla with Koti Diji, where the Kot Dijian occupation is reported to have ended in fire. But, a recent detailed analysis of the antiquities found in the citadel mound of Kot Diji, under preparation by the present author., clearly demonstrates a cultural continuity throughout. The only exception is with the female figurines and steatite seals which do not occur in the Kot Dijian levels. Otherwise, all categories of objects from the mature Harappan levels (1) to (3D) are present in the early Harappan (Kot Dijian) levels, namely, stone blades, cores, balls, pestles, grinding stones; terracotta 'cakes', cones, bangles, bull figurines, cart-frames and wheels; copper objects; shell bangles and other objects; and beads of agate, paste and carnelian. Moreover, like Gumla, there is a continuity of many pottery forms between the lower and upper levels of Kot Diji-an important fact which is generally overlooked by most scholars. Whatever meaning may be attached to the "burnt" level at Kot Diji (and at Gumla), there is no evidence to suggest a break in the material culture. The visible change in ceramics and their standardization, and the appearance of new types of objects like seals, female figurines, etc., in the mature Harappan levels of Kot Diji, have to be explained in context of the process of urbanization in the Indus valley."

In brief it may be stated that the evidence available so far does not prove that the Aryan invaders were responsible for the destruction of the Indus cities. There were

[1] M. R. Mughal 'A Summary of Explorations and Excavations' in Pakistan', *Pakistan Archaeology* (Karachi, 1972) No. 8. p. 114 ff.

several forces at work which brought about the downfall of Indus cities. Among them flood played a major role. In estuarine regions and elsewhere we see the Harappans making efforts to protect their settlements against floods by reinforcing the mud-brick walls and platforms with burntbricks or by raising the general level of occupation. These platforms and peripheral walls are often misinterpreted as defenses. The frequently devastating floods tired out the residents and with the relaxation of anti-flood measures the destruction became inevitable. It is true that other causes like gradual dessication and internal decay were also operating, but the direct cause appears to be flood.

4. TRANSMUTATION OF THE HARAPPA CIVILIZATION

The excavations at Lothal and Rangpur and other explorations in Kathiawar have clearly demonstrated that the Harappa Civilization did not die a sudden death in 1900 B.C. although it suffered from the convulsions resulting from the wholesale destruction of the industrial and commercial centres of the civilization in the Indus valley and elsewhere. The inhabitants moved to higher regions to the north and east of the Indus valley. Siswal, Mitathal, Alamgirpur and Ambkheri are important Late Harappan settlements where pottery and other remains have been unearthed recently. In the North, Rupar is a larger settlement where, traces of the decadence of the Harappa Civilization are perceptible. Mention has been made earlier (above p. 14 ff.) of the fact that a large part of the population living in the lower reaches of the Indus left for Kutch and Kathiawar and made small temporary settlements near the estuarine ports. Absence of planning and lack of civic amenities are apparent in the refugee settlements everywhere. Ill-fed, ill-equipped and suddenly cut-off from the metropolitan centres the settlers had to be content with inferior tools and ornaments produced from the locally available material.

The jerry-built houses, shabby drains and baths of Rangpur II B—IIC, Somnath and Lothal B, while suggesting the continuance of Harappan traditions reveal a marked decline in the standards of construction. The inferiority of the material equipment becomes apparent from the short blades of jasper which replaced the long chert blades and the terracotta beads which replaced faience and steatite beads. For some time copper and gold became very scarce. It may be recalled here that besides the inferiority of the fabric, the Harappan ceramic wares underwent change in form and decoration. Painting was limited to the upper half of the vessel surface, and the motifs consisted of horizontal bands and vertical wavy lines drawn in groups, chevrons, diamonds, loops and fronds. Occasionally stylized peacocks, caprids and cattle were also drawn. On the whole, decoration was simple and less ambitious than in the mature Harappan phase. Except for the ibex drawn in outline, all the geometric and naturalistic patterns were basically Harappan and were drawn earlier in a schematised way. Even the flowing wavy lines gazelle with sweeping wavy horns or curved ones which became more conspicuous in Lothal B can be seen on the jars from Lothal A and Kalibangan. The colour scheme in painting, however, remained the same as before namely black on red. The black and red ware became more popular. A distinctive culture noted for a new technique of surface treatment of vessels was evolved from the decadent Harappa Civilization in the next stage

in Rangpur II C and it is designed as Lustrous Red Ware Culture. The earlier stages of evolution of forms are noticed in Lothal B and Rangpur II B, II C, while the lustrous red colour of the vessels occurs for the first time in Rangpur II C and III, Rojdi II and Somnath II. The degeneration of the Lustrous Red Ware Culture itself took place at the end of the second millennium B.C. in Machiala Mota and Kanasutaria.

It was mentioned earlier (above p. 15) that the pressure of incoming refugees forced the Harappans from the coastal plains to the interior of Kathiawar. The initial village settlements were therefore gradually enlarged, the chief among them being Devaliyo, Babarkot, Akrau, Bhimpatal Gop, Rangpur, and Kanasutaria. There was another movement, perhaps limited to the technicians, towards central India and the Deccan. The resultant cultural interaction is seen in the adoption of the inverted or double firing technique in ceramic wares and the crested-ridge guiding technique in producing stone blades by the chalcolithic folk of the Banas, Chambal and Narmada valleys on the one hand and the Tapti and Godavari valleys on the other. Evolved Harappan ceramic types such as the carinated bowl and dish-on-stand travelled beyond Kathiawar upto Ahar in the north and Prakasha and Jorwe in the south. The Harappan colour scheme and motifs were also adopted for painting the local and borrowed wares. While there is little trace of direct contact between the mature Harappan settlements in Kathiawar and the chalcolithic sites of central India, there is definite evidence of exchange of goods and ideas between them in the first half of the second millennium B.C. For example, the Lustrous Red Ware of Kathiawar has travelled to Ahar, Navda Toli, Eran, Prakasha and Chandoli. It is interesting to find that the chalcolithic folk of Eran I used identical ceramic forms as the Lustrous Red Ware people did and the decorative style is common to both.

The decline of the Harappa Culture is apparent from the inferior ceramic wares, the disappearance of certain typical Harappan pottery forms, the absence of seals and the scarcity of chert blades and weights in some of the eastern and northern sites of the Chautang, Sutlej and Upper Ganga valleys (fig. 1). The so-called Ochre Coloured Pottery is said to represent the Late Harappan ceramic tradition. This pottery has a wide distribution from Bara near Siwalik hills in the north to Mitathal near Bhiwani in the south, from Katpalon near Jullundur in the west to Manpur and Bhatpura in the east. The decadent Harappa Ware is noticed at Ambkheri[1] on the Yamuna and at Bargaon[2] too. In Mitathal II B the classicial Harappan types such as the beaker, dish-on-stand and perforated jar gradually disappear, while evolved Harappan shapes make their appearance. A few Cemetery 'H' types are also noticed. This phase of Mitathal (Late Harappan) is said to have been marked by an "exuberance of shapes and painted designs suggesting an almost resurgence of Siswal tradition". Among copper objects found in this

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[1] A Ghosh (ed) *Indian Prehistory* (Poona 1964), p. 128; also *Indian Archaeology*—A Review (1962-64) pp. 53-56

[2] A Ghosh (1964) *Ibid* pp. 127-128; also see S. R. Rao (1973) *op. cit.* p. 34.

phase are a ring comparable with those of Bargaon and Bahadarabad[1] and a battle axe *(paraśu)* reminiscent of the Khurdi hoard and Diamabad I[2]. According to Suraj Bhan, the Bargaon ceramic industry, i.e., the 'OCP of Group A' is found to have been evolved from the fusion of the Harappan and the Kalibangan (pre-Harappan) or Siswal traditions-a process which had already begun in Mitathal II A, with a sprinkling of Cemetery H traits in the post-Harappan turmoil. "The eastward movement of the people from atleast northern Rajasthan forced by floods and growing desiccation of the region due to hydrological changes" is also recorded by him. He adds "the horizontal expansion of this vertically emerging Harappa-dominated composite culture gradually shed off the classical Harappan elements till they were rendered as destitute as the OCP people of Group A"[3]. From these details the degeneration of the Harappa Culture and its readjustment in the course of an eastward movement become quite clear. A similar process of degeneration and readjustment in Kathiawar[4] and Narmada-Tapti valleys[5] when the Harappans came in contact with local people in North Gujarat is noticeable at Kanasutaria, Sujanipur and Zekda on the one hand and in the Tapti-Godavari valleys upto Ambhore on the other. This is not all. The Late Harappans are found to have moved into the Kabul valley via. Sarai-Khola in the Northwest and established trade contact with Altin-Depe in south Turkmenia[6] via, Al-Khola, a Late Harappan site near the Oxus in Afghanistan. There was thus a two way traffic between the Indus valley and Turkmenia in the Late Harappan period, which is now confirmed by the discovery of Late Harappan pottery and an Indus seal at Altin Depe. Traffic with Mundigak via Gomal valley is not ruled out. The wide dispersal of the Late Harappa Culture upto Alamgirpur on the east, Mundigak on the west, Altin Depe in north-west and Ambhore in south is a new factor which should be taken into account while recounting the contribution it made to the successor cultures in the respective regions.

In conclusion we may say that the excavation at Lothal has thrown new light on the vertical and horizontal expansion of the Harappa Civilization. It has added a maritime province to the Indus Empire and disproved the theory that the Harappa Civilization came to a sudden end. It has given the Harappans a high place of honour in the development of marine engineering on account of the dock, wharf and warehouse which they built at Lothal. It is again Lothal which has adduced convincing evidence of evolving a linear alphabetical system of writing from a partly-syllabic-cum-alphabetic system and has thereby greatly facilitated decipherment of the Indus script. It is further observed that the language of the seals belongs to the Indo-European family showing close affinity to the

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[1] Y. D. Sharma 'Copper Hoards and Ochre Colour Ware in Ganga Valley' *International Conference on Asian Archaeology—Summaries of Papers* (New Delhi 1964).

[2] *Indian Archaeology—A Review* (1958-59) p. 15; also see M. K. Dhavalikar 'Daimabad—a Rediscovery' *Purātattva* No. 3 (1969/1970), p. 35.

[3] Suraj Bhan (1975) *op. cit.*

[4] S. R. Rao (1973) *op. cit.* p. 181 *ff*; 184.

[5] *Ibid.* p. 185 *ff.*

[6] Information from Sri B. B. Lal.

language of the *Rigveda* in phonology and semantics. A large number of words of the *Rigveda* are etymologically traceable to the Harappan words. The provincial style of painting pottery, the joint burial system, the offering of animal in sacrifice and the worship of the Fire God in preference to the Mother Goddess noticed at Lothal highlight the freedom enjoyed by the people in observing different religious and social customs. Hence the oft-advanced argument that the Harappa Civilization suffered from conservatism which resulted in decadence of the culture is not borne out by facts. The theory of destruction of Indus towns and cities by invading Aryans should now be discarded in the light of the fast accumulating evidence of natural causes such a floods, tectonic disturbances and changing river courses which forced the Harappans to leave for safer places and to readjust themselves when they came in contact with other chalcolithic folk in the north and Neolithic-Chalcolithic people in the south.

In technological development the Lothal craftsmen did not lag behind the Sumerians. For example the former invented the circular saw and the twisted drill. They adopted a unit equal to the *angula* for linear measurement and introduced the decimal system. Their greatest contribution to the progress of world civilization lies in evolving an alphabetic system of writing which became the basis of the Semitic alphabetic system.

POST-SCRIPT

HARAPPAN SCRIPT A MIXED WRITING

This post-script has been added at the suggestion of some scholars with a view to explain certain unique features of the Indus Script mentioned in Chapter IX. The early Harappan writing of the Indus valley people, called here the Harappan Script (2500-1900 B.C.), was a mixed one involving the use of picture-signs such as the 'pipal leaf', 'scorpion', 'hill', 'field', 'birds' and 'insects' alongside linear (termed 'cursive' by Gelb) and numerical signs. The Hittite non-cuneiform syllabic writing of the mid-second millennium B.C. was also a mixed one, as in the inscription on the socalled Sultanhan Stele, but the Harappan Script involves the use of some pseudo-pictures as distinct from the true pictures of 'pipal leaf', 'bird' etc. The former are compound signs formed by joining primary forms of 'basic signs' which are either linear or diagrammatic as in the case of the sign for 'man', 'fish' etc., but they were phonetized and used as single-sound signs with their vocalic variations indicated by the addition of auxiliary signs in the form of short strokes attached to them. Let us take for example, the basic sign of 'man' (fig. 36E,*4*). In the first instance short strokes, 1 to 3 in number, are added to it, the purpose being the same as in other ancient Indian scripts such as the Brāhmī, namely the indication of the vowel value. In Brāhmī, however, a different direction of the stroke meant a different vowel. Sometimes an independent 'cup'—like sign which served as initial vowel *a* was added to the 'man' in Harappan Script (fig. 36E, *8*.) to form an open or closed syllable such as *ṛa* or *aṛ*. Other basic signs were joined to form compound signs, which look like pictures, but they had no picture or word value. The socalled picture of a 'man holding trident' reads *ṛ+k* = *ṛk* or *aṛk* (fig. 36E, *6*). Similarly, the 'man with a belt' is a combination of signs for *ṛ+ha* = *ṛha* = *arha* while the socalled 'soldier hoding a shield' reads *p+ṛ* = *pṛ*. It would therefore be wrong to interpret sign *7* in fig. 36E as of a 'porter carrying load'. Even here the process of combining basic signs is too apparent to be interpreted as a picture. Sign 7 is considered by Mahadevan and Gurov as pictures of persons carrying water pots and load, but in fact, they are ligatures in which other basic signs are joined to the basic sign of 'man' which had a phonetic value.

The basis on which phonetic value is assigned to linear signs is explained earlier (p 178); further explanation is given below for three signs. In the South Semitic Script the sign for *m* is closed at the top (fig. 36E, *12*), but in the Indus seal from Djokha it is open as in the Brāhmī Script (fig. 36C). This sign is turned by 90° in Harappan Script. Secondly, the double-lined arc-like sign which has the value *m* in South Semitic (fig 29, *12*), is an allograph of the single-lined arc in Harappan Script and is given the value *p*. Thirdly, the compound sign *8* in fig. 31B should be read *bag* instead of *pag* as the first basic sign resembles the Semitic sign for *b* (fig 29, *1*) with a tail. Similarly, sign *9* should be read *bhag* or *bagh* instead of *phag* or *pagh*. The compound sign *10* in fig. 31B can be read as *ṛk*, or *kṛ* and similarly, no *9* as *ppṛa* or *papṛ*, as only one short stroke has been added to *p+p+ṛ*.

The doubling of phonetized signs for stress is another feature of the Harappan Script (fig. 36E *7* to *9*). The principle of formation of compound signs with a view to derive conjunct consonants i.e., *Samyukta aksharas* noticeable in Brāhmī and Nāgarī scripts had its origin in the Harappan Script itself. For example, in Asokan inscriptions *sya* is formed by combining signs for *sa* and *y*, and to write *pta* in Nāgarī, *pa* and *t* are combined. The Harappan scribe devised the method of joining signs to write syllables such as *hah*, *pap*, *pat*, *ppat*, and conjunct consonants such as *pṛ*, *ppṛ*, *ppṛa*, *pta*, *ṛha* etc. In carrying out the structural analysis of the Indus script one should analyse the compound signs into their basic forms, but Mahadevan and Gurov have avoided analysing the pseudo-pictures i.e. compound signs, as they know that it will disprove their theory that the Harappan language is Dravidian. Among other reasons, the principle of forming consonant clusters and conjunct consonants underlying the formation of pseudo-pictures in Indus writing makes the Harappan language non-Dravidian.

The picture-signs of 'pipal leaf', 'mountain', 'field', 'bird' etc occurring in the Harappan Script, but not in the late Harappan Script, are found to have been used for expressing complicated unisyllabic or disyllablic sounds such as *aśv* (from *aśvattha*), *adṛ* (from *adri*), *ksh* (from *ksham* or *kshetra*), *śak* (from *śakuna*) etc. The diagrams of 'man' and 'fish' used in the Harappan and, for sometime, in the late Harappan scripts had ceased to be picture-signs. They served as single-sound signs standing for *ṛ* and *ś* respectively and their vowel variations were indicated by attaching diacriticals (short strokes).

The evolution from a logographic-cum-rebus system involving the use of pictures, pseudo-pictures, cursive and linear signs into a purely non-semantic phonetic system comprising mostly cursive and linear signs and very few compound signs (fig. 36C) formed by joining cursive signs is noticeable even at Mohenjodaro. For example, compare the writing on a number of seals obtained from the early excavations of Marshall and Mackay with that on the seals from latest levels excavated by Dales (fig. 26), wherein most of the pictures are dropped. Further simplification of the writing is seen at Rojdi and Rakhi Shahpur. A striking feature of the evolution was the replacement of pictures by compound signs formed by joining linear ("cursive") signs. To cite only two examples. In fig. 21 the picture-sign for 'hill' with acrophonic value *adṛ* is used to write *phadṛ* = *bhadṛ* (in the inscription reading *aśva-pa "ph-adṛ-ma-ā*,) whereas the compound sign combining *d+ṛa* is used to write *dra* in *phadra* (*pha-dra "tṛ-ka"*). In an inscription (fig. 36E, *18*), the linear sign for 3 is used in the rebus way for writing *tṛ/tra*, as in Hittite. The rebus system was replaced by the alphabetic system, where the signs for *t-ṛ-a* are used to write *tra*. Similarly, the often used syllabic sign *pak* was replaced by the alphabetic signs *p-a-ka*. Scores of examples of the simplification of writing can be adduced from the Harappan and Late Harappan inscriptions.

Morphic Structure

After analysing the compound signs and determining the phonetic value of the basic signs (pp. 176-178), the morphic structure of the Harappan language has been ascertained. Instead of making arbitrary cuts, as has been attempted by Mahadevan and Gurov to arrive

at 'blocks' or 'pairs', the clues available in the inscriptions have been followed by me. This point can be illustrated from the following three inscriptions. In fig. 36E the two inscriptions in No. 13 read *ś-da* (*śa-da*) and *ma-ḥā-ś-da* = *mahāśada*; No. 15 reads *ś-ḥā-ś-da*, wherein *ś-da*=*śada* is common to all. *Maḥā* and *śaḥa* occur in other inscriptions just as *ś-da* and *śa-da* are also written frequently elsewhere. Hence the syllables *śada, maḥa* and *śaḥa*=*śaka* are found to be semantically independent and convey in Old-Indo-Aryan the meaning 'eminent', 'great' and 'powerful' respectively.

The morphic structure of the Harappan language can be understood with reference to the elements of the language having independent meaning. Each element may comprise a single phoneme such as *pa* or *pā* 'protect', *ga* or *gā* 'sing', *ra* or *rā* 'bestow', *da* 'give' etc., or may be a combination of phonemes, eg., *pa-ra* which is a compound word meaning 'beyond' or 'supreme'. If we go one step further we may separate the first two signs reading *pa-rā* from the next two signs reading *ttṛ-ka* in the inscription reading *parāttṛka* meaning 'supreme triad (or saviour)'. The signs for *tṛ-ka* occur in several other inscriptions all by themselves. Hence *tṛka* should be taken as a semantically independent phoneme. Even in the compound word *parā* each syllabic sign namely *pa* and *rā* may be semantically independent, eg. *pa* 'protect', *rā* 'bestow', but we are not sure whether *tṛ* 'save', and *ka* 'enjoy' (from *kan*) or Prajāpati (?) can be treated as separate words. Perhaps *tṛka* is one word meaning 'consisting of three (triad)' or 'saviour'. The sole occurrence of single-sign words such as *pa, ṛa, ṛ, pak, ṛh* etc., which are roots or nominal stems of zero suffix help to effect cuts, but the 'pairs' or 'blocks' of signs produced with the help of computers are too arbitrary to give any clue to meaningful phonemes.

In mechanically reproducing some of the Indus signs the minute distinctions made by the Indus scribe have been ignored by Mahadevan although they are very significant in determining the phonetic value and vowel variations. To cite an example the so-called 'man' sign and another similar sign 'without arms' stand for two different sounds, the former for *ṛ* and the latter for *t* (See Fig. 29, Cols. 4 and 5, No. *20* and *15*), while no such morphic distinction is made by Mahadevan and Gurov. Similarly, the number of horizontal lines in the socalled 'comb-sign' is uniformly taken to be five although the number varies from 3 to 6 in several inscriptions depending upon the vowel value of the laryngeal *h*.

Indus and Semitic Scripts

The theory that Old North Semitic alphabets were independently evolved does not stand to reason because the normal process is to evolve an alphabetic system from a syllabary which itself is evolved from a phonetized partly-cursive and partly-diagrammatic or pictographic writing. All the three stages through which the Indus Script has passed are traceable in the early and late Harappan inscriptions ranging in date from 2500 B.C. to 1200 B.C. The earliest pictographic stage is however not known.

The attempt to trace the Semitic alphabets to Hittite Hieroglyphic and Cretan syllabary has not been successful. On the other hand, fifteen signs out of twenty-three in the Semitic (i.e, Lachisch and Ahiram inscriptions of the 13th Cent. B.C.) are identical with the late Harappan alphabetic signs which had acquired single-sound status by 1800

B.C. The Semitic scribes must have found the late Harappan signs for consonantal value more distinct and simpler than syllabic signs in other systems of writing and therefore took over most of the late Harappan signs.

Problems of Reconstruction of the Harappan Language

One has to admit that documentary evidence of a very ancient language such as the Harappan is limited in its value because it is often difficult to recover the exact value of the symbols used. This is true of Hittite, Archaic Greek and other Indo-European languages as well. This difficulty is partly solved in the case of Harappan Script as we have a guide to correct pronounciation of Vedic texts, the language of which is related to the Harappan language. The latter is earlier in date and the stages of its of develoment can only be surmised on the basis of a limited number of stratigraphically arranged inscriptions from Lothal and Kalibangan which serve as the basis for determining the chronology of 2800 seals from the Indus Valley sites. The phonetic value given to late Harappan signs is based on the sound value of identical Old Semitic alphabets. It is likely that the Harappan pronounciation of *p*, *f* and *ph*, *h*, *h*, *ḥ*, and *k* was slightly different from the Semitic, but this is a minor issue, since the use of vowel-indicators and formation of *samyukta aksharas* suggest the language to be non-Semitic, and the Harappan vocables are comparable with those in Old Indo-Aryan.

It is true that not many verbal forms are available in the Harappan inscriptions. This is so because the subject-matter of the seals was such that only nominal and adjectival forms had to be used. Occasionally, root-nouns also occur, but it is gratifying to find that the earlier Indo-European forms which were stable and remained unchanged in Old Indo-Aryan (Rigvedic Sanskrit) occur in large numbers in the Harappan language, confirming thereby that it belongs to the Indo-European family of languages.

Lastly, the syllabic value given on acrophonic principle to pictures of 'field', 'pipal leaf', 'scorpion', 'hill', 'plant' and 'hand', which occur more frequently than others in Harappan Script, is satisfactory in most cases. The syllabic value suggested for other pictures e.g. 'eagle', 'triangle with horizontal lines', 'compartmented rectangle', 'ant', 'fence', 'horn', 'ploughshare', 'harp', 'three triangles', and 'crab', which occur occasionally (fig. 30), is not quite satisfactory and alternate values are possible, but it may be added that these signs account for less than one per cent of the total number of occurrences of all signs. As such they do not materially affect either the methodology of decipherment adopted here or the phonetic or syllabic values given to other linear, cursive and picture-signs.

The word-value given here to numerical signs can be verified with reference to Old Indo-Aryan and Indo-Iranian words for one, three, seven, ten, and hundred occuring in the Indus inscriptions and written alphabetically.

Explanation of Figure 36E

The initial vowel sign for *a* of zero degree (*samvṛta* sound) in HP comparable to the initial vowel sign in Hittite Hieroglyphic writing served, at times, as medial *a*

(item 3) in HP. It was also turned upside down as in Hittite. By the addition of strokes the length of vowel *a* was increased and it served as a diphthong *ae* or *ao* (vide item 1). The more common method of indicating the medial vowels *a, ā, ae, ao* etc., was to attach one or more short strokes to the consonantal sign (vide items 2 and 4) as in Brāhmī (item 5). Items 6 and 7 explain the process of joining other basic signs with the phonetized 'man' sign to write conjuncts *ṛk, ṛh, ṛha, pṛ, ppṛ* etc., and these are distinguished from the syllables and conjuncts *ppat, ppāt, ppha, ppta* ete., (vide items 8 and 9). Variants for *m* in Semitic and HP are given (item 12) as also the revised reading of the compound sign shown under item 11. The transcription and transliteration of the HP inscriptions providing a clue to identification of meaningful phonemes and the use of Indo-European words for numerals are included in items 16 to 22, and their transliteration is given below,

16. *ph-adr-ae-ka-sāś-bhag-ā=* *phadṛ* (or *bhadṛ*)*-aeka-śās-bhaga*	'auspicious singular ruler gracious'
17. *pa''-t-tṛ-ā=pa''-ttṛā*	'protect'' saviour'
18. *pa-rā-ttṛ-ka=parā-ttraka*	'supreme saviour or trial'
19. *ḫa-ppta-dvappā=happta-dvipa*	'seven regions'
20. *da-ś-ḥa=daśaḥa=daśaka*	'consisting of ten'
21. *da'-śa' da=daśa da*	'bestower' (of) ten
22. *pa-ae-dva-śa-t-h-p-ā=* *paae-dyu-śataha-pā*	'to protector: heavenly, protector of (the) hundred'.

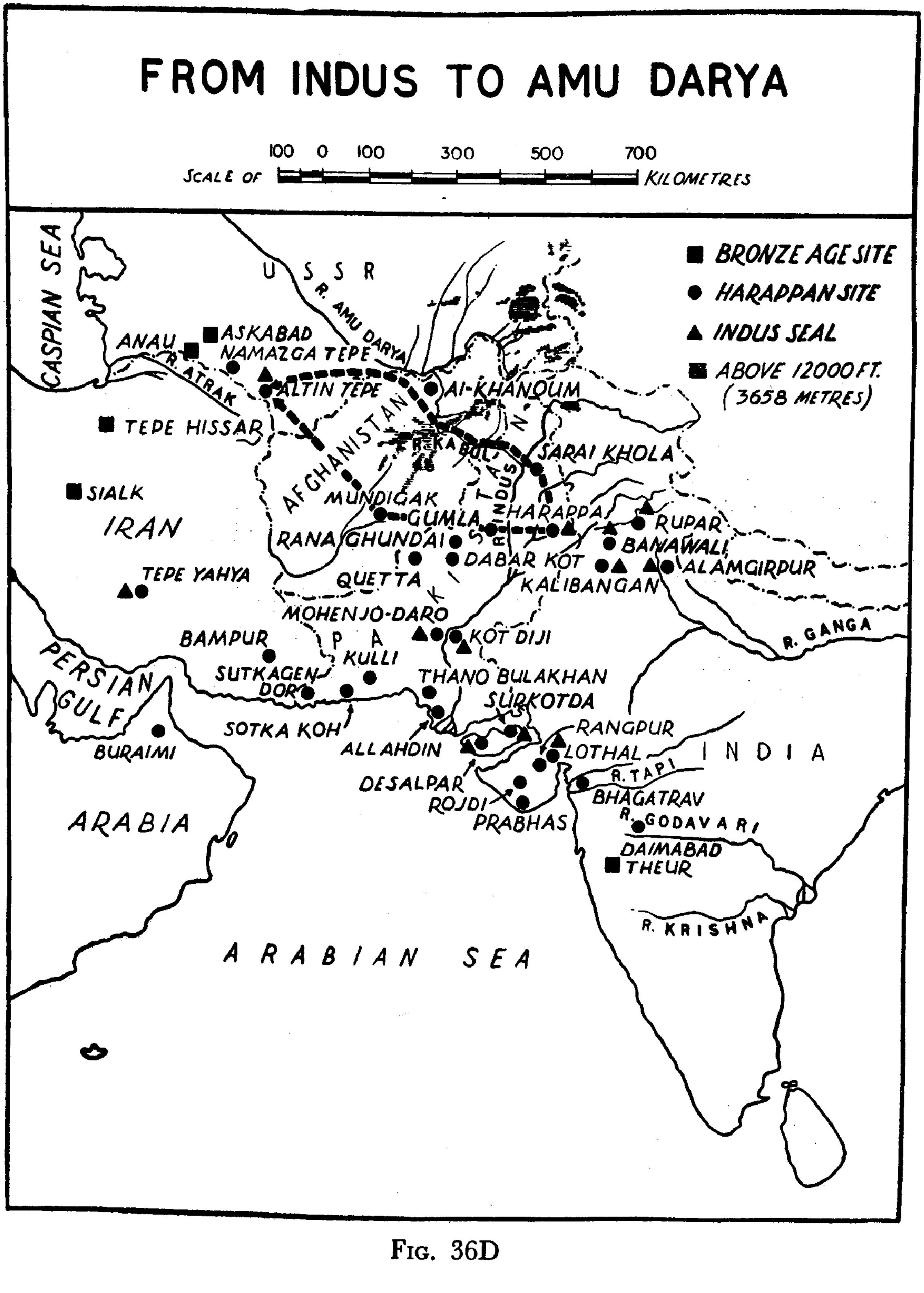

FROM INDUS TO AMU DARYA
100 0 100 300 500 700
SCALE OF KILOMETRES
BRONZE AGE SITE
HARAPPAN SITE
INDUS SEAL
ABOVE 12000 FT. (3658 METRES)
CASPIAN SEA
U S S R
R. AMU DARYA
ANAU
ASKABAD
NAMAZGA TEPE
R. ATRAK
ALTIN TEPE
AI-KHANOUM
TEPE HISSAR
AFGHANISTAN
KABUL
SARAI KHOLA
SIALK
IRAN
MUNDIGAK
GUMLA
HARAPPA
RUPAR
RANA GHUNDAI
BANAWALI
DABAR KOT
ALAMGIRPUR
TEPE YAHYA
QUETTA
KALIBANGAN
MOHENJO-DARO
R. INDUS
PAKISTAN
KOT DIJI
BAMPUR
KULLI
R. GANGA
PERSIAN GULF
SUTKAGEN DOR
THANO BULAKHAN
SURKOTDA
SOTKA KOH
RANGPUR
BURAIMI
ALLAHDIN
LOTHAL
INDIA
R. TAPI
DESALPAR
BHAGATRAV
ROJDI
PRABHAS
R. GODAVARI
ARABIA
DAIMABAD
THEUR
R. KRISHNA
ARABIAN SEA

FIG. 36D

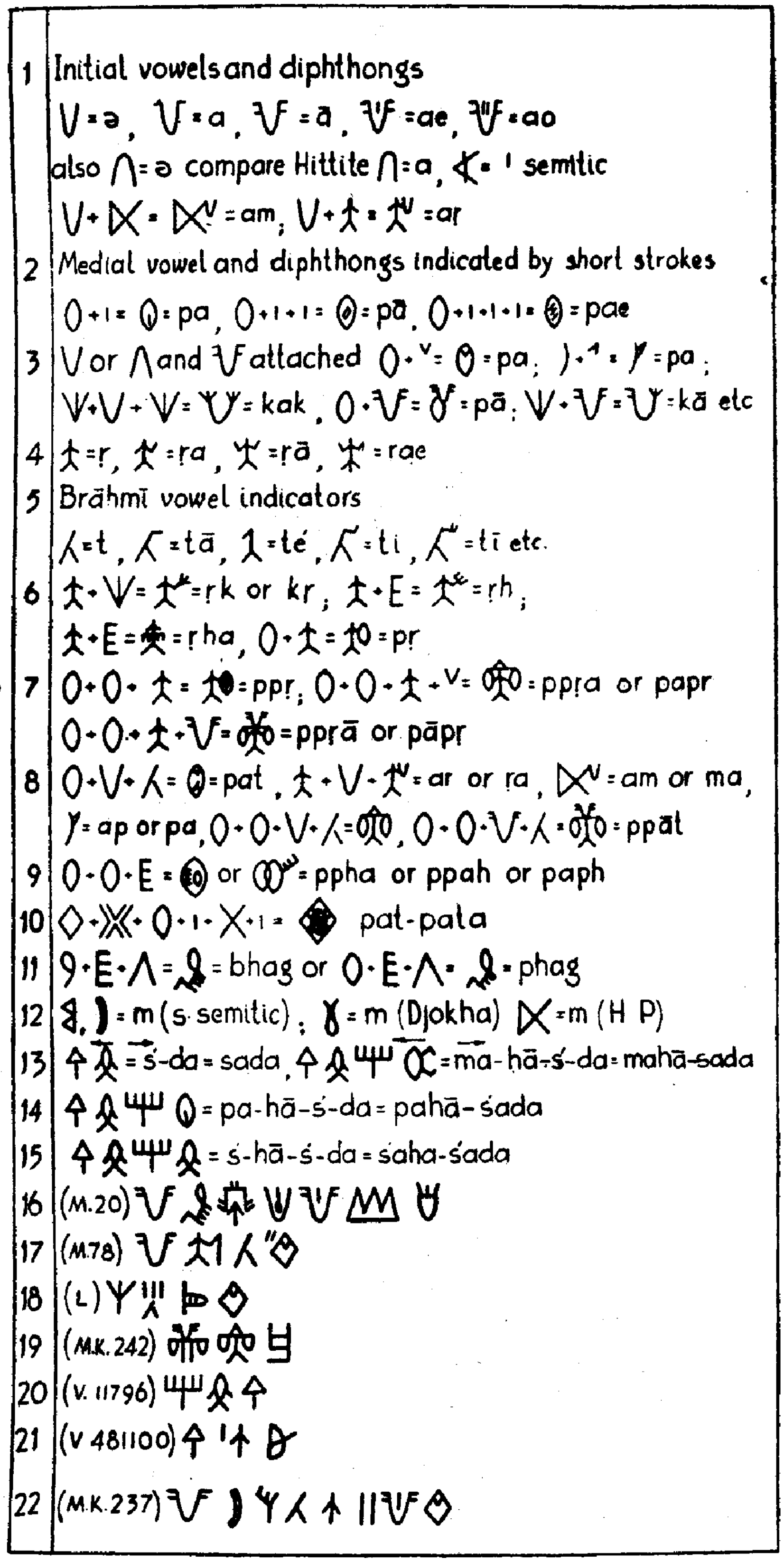

Initial vowels and diphthongs
also ə compare Hittite a, ' semitic
Medial vowel and diphthongs indicated by short strokes
Brāhmī vowel indicators
ppha or ppah or paph
pat-pata
bhag or phag
m (s semitic) ; m (Djokha) m (H P)
sada, ma-hā-ś-da = mahā-sada
pa-hā-ś-da = pahā-śada
ś-hā-ś-da = śaha-śada
(M.20)
(M.78)
(L)
(M.K. 242)
(V. 11796)
(V 481100)
(M.K. 237)

FIG. 36 E

TRANSCRIPTION AND TRANSLITERATION OF INSCRIPTIONS

Plate CXXV

1. *p-ā=pā* 'protect' or 'protector'.
2. *ppṛ* or *papṛ* 'protect' or 'protector'. Papṛ is also the name of a people.
3. *pp-ka=ppaka=paka* 'guardian'.
4. *ppa-ka-hā=ppakaha=pakaha* 'of guardian'.
5. *p-ka-ae-ba-ka-ā=pakae bakā* 'to guardian from Baka'.
6. *a-ma=ama* 'power' or 'powerful'.
7. *ma-nā=mana=Manu* 'man par excellence'.
8. *ma-ẖā=maha* 'great'.
9. *pah-mhhah=pah-mahah* 'protector of great'.
10. *phag-ā* or *bhag-ā=bhaga* 'gracious Lord (or bountiful)'.
11. *ppak-rā=paka-rā* 'guardian bestower'.
12. *pa" ś-da=pa" śada* 'protect" eminent'.
13. *pa" śa-kka-ā=pa" śaka* 'protect" powerful'.
14. *śa-ḥḥakā=śaḥḥaka* 'victorious'.
15. *pa" śa-ḥḥak-ā=pa" śaḥḥaka* 'protect" victorious'.
16. *śa-ma-ā=śamā* 'happy' or 'auspicious' or 'calm'.
17. *śa-ma-hā=sah-mahā* 'victorious great' or *śśamaha* 'of auspicious'.
18. *śa= śaka* This is a title or name.
19. *arḥā-hā=arhaha* 'of (the) deserving'.
20. *rḥa-pa=arha-pa* 'able protector'.

Plate CXXVI

21. *śa-rā' ṛa* 'Śara bestower'. Śara is the name of a person (RV).
22. *bhag-ṛka* 'bounteous Arka'.
23. **śa-śa-mā-hā=śaśa-maẖa* 'Śaśa great' or *śāsa-mahā* 'ruler great'.
24. *pa" hapt-ā* 'protect" Seven' or 'protector of the seven'.
25. **ppra- "śa-ma-ẖā=pra" śamaha* 'great peaceful'.
    or *papṛ " śaka-maha* 'protect" powerful great'. or 'Papṛ powerful great'.
26. **patṛ" śa-śa-hā-pa-ā=patṛ" śāśaka-pā* 'protect" save, commander protector'.
27. **pa-rā-ttṛ-ka=parātraka* 'supreme saviour'.
28. **gā-ra' śā-ma-ā=gara' śama* 'Gara' peaceful'.

Note: Inscriptions 23, 25, 26, 27, and 28 above have been reversed for positive impressions before reading from right to left.

Plate CXXVII

29. *pata" hapt-sāś-ā=pat" hapta-śāsa* 'govern (or governor)" ruler of seven'.

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